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Indexed in the Industrial Arts Index. Published every Thursday. Subscription Price: North America, South America and U. S. Possessions, $8; Foreign, $15 a year. Single Copy, 35 cents.

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Cable Address, "Ironage" N. Y.

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This Week in The IRON AGE

Vol. 156, No. 6 August 9, 1945

Editorial

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Technical Articles

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News and Markets

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How Ryerson Assures Alloy Steel Quality

Each alloy shipment is personally inspected and tagged as a part of a rigid quality control system, which we call the Ryerson Certified Steel Plan. This plan covers: selection of the individual heats of alloy steel, the testing of samples from each heat, the positive identification of every alloy bar with stamped heat symbol and painted color markings (or with metal tags), and a Ryerson Alloy Steel Report, which is sent with each shipment. This report shows complete test information for the particular heat of steel used in filling your order. It contains: chemical analysis, recommended working temperatures, the Jominy hardenability results, and an interpretation of physical properties for 1, 2, 3 and 4 inch rounds quenched and drawn at 1000°, 1100° and 1200° F. The report serves as positive identification, a check on quality and as a guide to satisfactory heat treatment.

The Ryerson Inspection Tag symbolizes the final culmination of our quality controls, because it places a personal responsibility on us for the fulfillment of every specification in your order. This is the Ryerson way of making sure that you get the right steel. Ryerson alloys all receive the same systematic care. Call Ryerson for alloy steels, or for any other type of steel, and be assured of uniform quality and prompt action.

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The IRON AGE

ESTABLISHED 1855

August 9, 1945

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Competition and Employment

COMPETITION among employers is the best guarantee of employment. If you will give this some thought, I think that the truth of the statement will become evident.

There is not as much competition in the diamond industry, for example, as in the beauty parlor business. Diamonds, as you know, are cartel-controlled with a tight price maintenance that keeps profits up and employment down. But with respect to competition in beautification, the sky is the limit.

In 1939, according to government figures, the wholesale value of diamonds sold to the United States was almost on a par with the business done by the beauty and barber supply houses. However, in the case of diamonds, it required the expenditure of $64,290 to create one job of employment, whereas in the business of scraping the cactus and painting the lily, a little over $8700 did the same trick.

Getting into the manufacturing end, there is less competition in manufacturing bluing than in making automobiles. Only 55 wage earners were employed in the bluing business in 1939, and it took a sales volume of $20,763 to keep each one busy. Whereas in the highly competitive machine tool industry in the same year, some 36,500 employees were kept busy at good wages at a sales volume of $6000 per.

Looking back over our industrial and commercial past record, I think you will find it true that not only where employers are highly competitive is there most employment, but also that in such cases the employment is created at a minimum of consumer cost. In general, it also follows that under these circumstances and because of employer competition, wages are best.

It would seem that labor would recognize these facts and therefore be strong for employer competition. And be strongly against monopoly in employment.

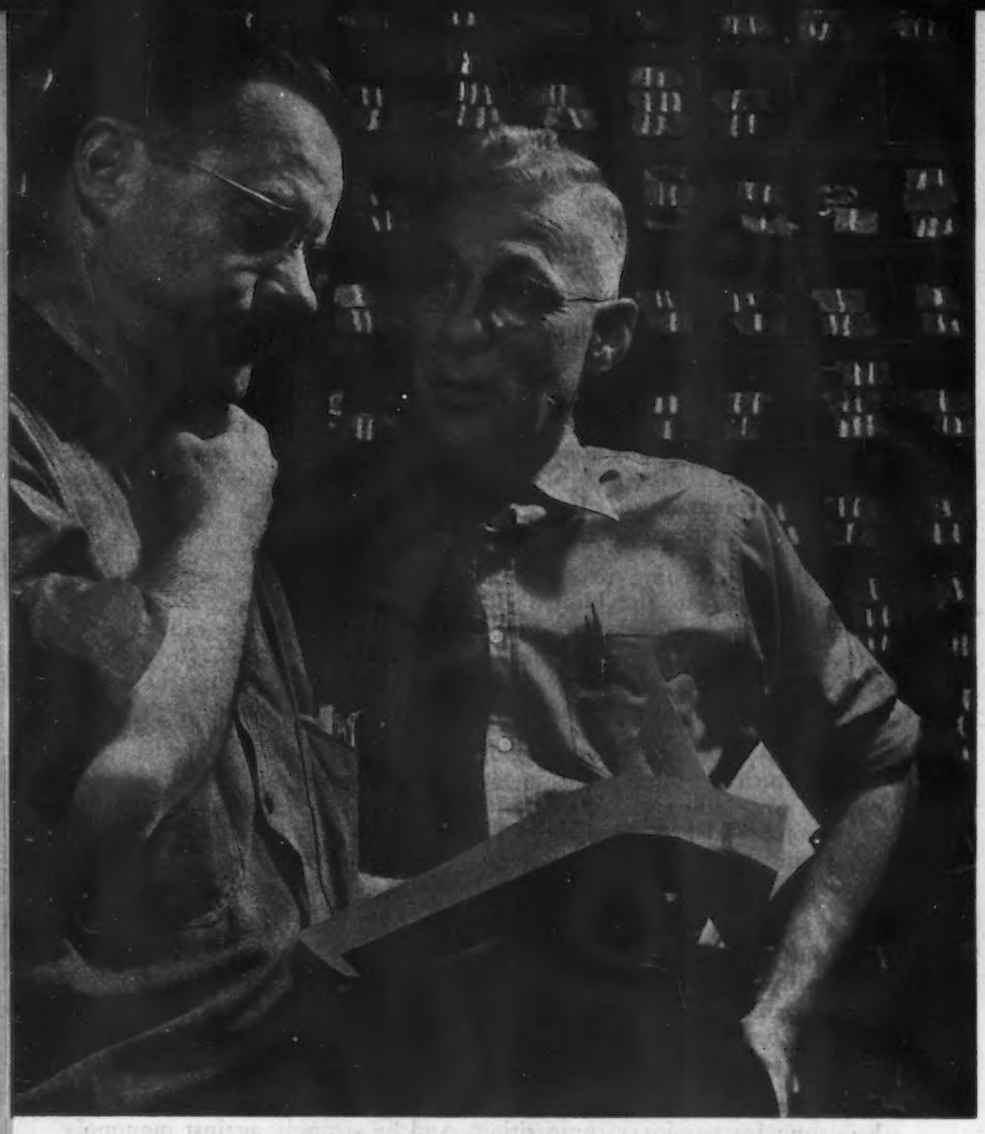
Monopoly in trade means monopoly in employment. It means the loss of the competitive urge because there is no pacemaker or dark horse, and nobody will bet on a one horse steeplechase.

Most disastrous of all is government monopoly of employment under state socialism. Nationalization of industries means but one employer in each, and the employer one who has no ownership interest. His tenure of office and that of his political henchmen may be temporarily secured by the finagling of national debt to the point where he and his heirs obtain their financial security at the expense of hungry millions. But the accounting must be finally made.

It is perhaps understandable why the people of the United Kingdom after their years of suffering have, in a spirit of defeatism, turned to state socialism as an out. And indeed it is an "out" rather than an "in." Certainly, doing away with the spirit of competition at home will not help them in the vital matter of competing abroad. And labor will be the chief sufferer.

Perhaps we should welcome a demonstration of the futility of nationalization of industry, but most of us will regret that our good British friends have to be the guinea pigs.

J. H. Van Deventer



Metallurgists and steelmakers review all orders that enter the Inland mill.

Steelmakers Confer With Metallurgists... on every order...at Inland

When an Inland metallurgist is away from his office—and that may be a large part of each day—he can be located in the mill. He may be in a superintendent's office talking processes, he may be at an open hearth furnace following through a heat, or he may be at a mill laboratory getting a record of physical tests.

This close cooperation between steelmakers and metallurgists is an important factor in producing quality steel, in improving processing methods, and in meeting the exact requirements of each Inland customer. Inland Steel Company, 38 S. Dearborn St., Chicago 3, Ill.

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INLAND STEEL

The IRON AGE
August 7, 1945

NEWS FRONT

➤ Official recognition of order duplicating at the mill level for nonrated steel as an important cause of inflation may be the forerunner of some prohibitive action by the WPB.

There are some doubts in Washington that an effective order could be drawn up for this purpose, but it may become essential.

➤ No formal bids have been received for purchase of the Geneva steel plant. The SPB disposal policy report required by law has not been submitted to Congress, so no sale can be made.

Under certain conditions the plant could be leased without Congressional approval of the plan, but the leasee would have to pay the reconversion costs.

➤ Detroit enthusiasm on auto production is being dampened by construction and materials problems. The latter is the most serious.

Steel, tin, textiles, and protective coatings are the most difficult to obtain. Scattered steel tonnage is coming through, but not in production quantities.

Tin can be had for coating pistons and bearings production, but its use is prohibited for body solder. Experiments are now under way to make a substitution, but they have not been brought to a successful conclusion.

No accurate signposts are seen on the pricing of 1946 cars, some sources feeling that an industry-wide platform will be established in the near future, while others feel that an individual pricing basis for each firm will be established.

➤ Experiments on a wide variety of steel compositions reveal that sub-critical annealing increases ductility and improves formability at comparatively low cost. An added advantage of sub-critical annealing is the reduction of scale formation and decarburization tendencies as compared with that at the higher temperatures.

Considerable experimentation with steels of different analyses indicates that the alloy content of the metal plays an important role in the rate of coalescence. It is easier to spheroidize straight-carbon steel than it is to produce the same degree of spheroidization in a steel containing alloys.

Spheroidization can be secured by first normalizing at a temperature slightly above the upper critical and then reheating to a temperature in the neighborhood of the lower critical. The carbon at a temperature slightly above the upper critical tends to form into finely dispersed particles. At higher temperatures, cooling through the critical tends to produce a coarser carbide structure not conducive to rapid spheroidization.

➤ A fundamental advantage in the use of high frequency induction heating for brazing and soldering is its flexible heat control. Also, the area heated by induction can be confined to a very narrow band and so operations can be performed without the danger of destroying plate, finishes or electric components enclosed in sealed containers.

➤ The Army is planning production of a new size shell, 250 mm, which will be produced probably by National Tube Co. National Tube figured heavily in the 240 mm project before its cancellation and has considerable production equipment in standby condition. An order for nearly 50,000 has been or is about to be placed.

➤ Evidence of the fact that the new 75 mm recoil-less rifle is beyond the experimental stage and advancing to the production stage was apparent this week when the only producer, a Pittsburgh firm, had its contract boosted from 100 to 1000 units per month. This may call for plant expansion and possibly further subcontracting of parts.

➤ Tentative Higgins plans for invading the West Coast include construction of a small boat plant in Los Angeles, and dreams of a drydock costing millions and a Seattle plant to enter the fishing-boat field.

Sub-Critical Annealing

. . . Sub-critical annealing may not be a panacea for all annealing problems, but the procedure has been used on a wide variety of steel compositions with resultant increased ductility, improved formability, and lower cost.

o o o

By E. E. HOWE

Chief Metallurgist, Chicago Vitreous Enamel Product Co., Cicero, Ill.

o o o

ONE function of draw-tempering is to relieve the strain in a hardened steel structure and thereby produce a softening of the metal. In some respects, draw tempering may be considered a form of sub-critical annealing as applied to a hardened structure. The mechanics of this softening with subsequent increased ductility that is accomplished by draw-tempering is attributed to the coalescence of carbides. The structure so formed has been termed sorbite, a material possessing unusual strength with high ductility. An extension in the length of time at temperatures approaching the lower critical produces a further coalescence with a corresponding increase in ductility. Since sub-critical annealing can enhance the physical properties of a fully hardened steel, similar benefits should be realized by utilizing this type of heat treatment on steel in the normalized or the annealed states.

Preliminary experiments based on this assumption furnished sufficient evidence to warrant further investigation. Sub-critical annealing when utilized on a wide variety of steel compositions resulted in the securing of increased ductility with improved formability as indicated by the initial studies. The remarkable increase in ductility so secured is obtained with relatively short heat-treating cycles at comparatively low cost. The simplicity of the operation, ease of control and reproducibility of results makes this a useful tool to fabricators of metal shapes working with steel. It is felt that insufficient attention has been given to the utilization of low-temperature heat-treating processes in obtaining marked increases in the elastic properties of steel. The reason for this probably lies in the fact that the process has been known for years and has been disregarded due to its simplicity.

An added advantage of sub-critical annealing is the reduction of scale formation and decarburization tendencies as compared with that at the higher temperatures. Prolonged heating does not produce heavy or tightly adhering scale nor lead to harmful carbon gradients. For this reason, furnace atmosphere control does not present any serious difficulties. It is interesting to note that a temperature of 1250° F used in sub-critical annealing can bring about a structural rearrangement which produces a change in physical properties. This structural rearrangement is readily detected by use of the microscope.

Considerable data have been published concerning heat treating, involving the cooling of metal from above its critical temperature. There is no doubt that such treatments could be augmented by or, in some cases, replaced with the use of a sub-critical anneal. In those instances where strength is of secondary importance to some other specific property, such as formability, sub-critical annealing can be used to good advantage. Steel, when subjected to this type of heat treatment can usually withstand more severe cold forming without rupturing. A few typical examples will serve to illustrate the practicability of annealing steel by this method.

Considerable loss through breakage developed in some 18 gage perforated mild steel sheet when given a 90 deg longitudinal bend with a ⅛ in. radius. By annealing the same sheet for 4 hr at 1250 deg F the breakage was completely eliminated. The subsequent improvement in this property of the steel was so great that it was even possible to bend the metal back on itself (180 deg bend) without an indication of failure.

Another example in which sub-critical annealing improved ductility was the case of some 3/16 in. hot-rolled NE8630 steel. These plates were hot-rolled material of extremely fine grain with an as-received hardness of 250 Bhn. The photomacrograph, fig. 1,

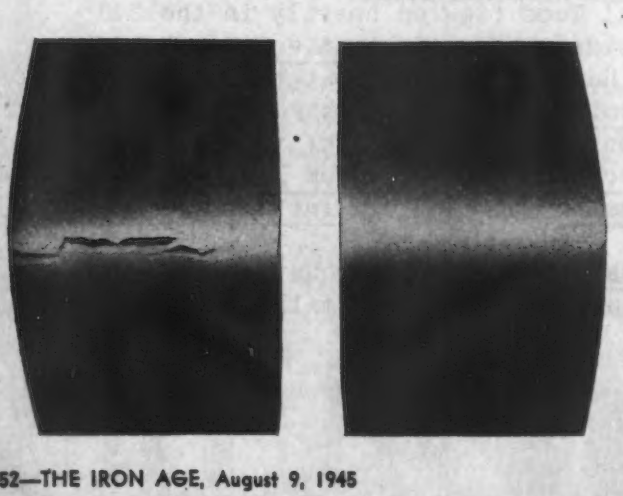

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FIG. 1 — Macrograph of NE8630 steel showing results of 90° bend. (Left) Before heat treatment; Bhn 250 (Right) After annealing for 3 hr at 1250° F; Bhn 195.

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clearly illustrates the effect of a 90 deg bend on the unheat-treated and heat-treated samples. A 3-hr 1250 deg F anneal lowered the hardness to 195 Bhn and permitted the 90 deg bend without hazard of rupture.

One manufacturer of steel stampings was experiencing difficulty from breakage on SAE-1045 steel. By annealing for 4 hr at 1250 deg F, this breaking during stamping was entirely eliminated. The microstructure of this hot-rolled ¼-in. steel is shown in fig. 2 at a magnification of 500 diam. It is of interest to note that a sub-critical annealing of short duration (4 hr) produces such a marked change in the structure as evidenced by fig. 3. The resulting material was free from breakage during the cold-forming operation. In this photomicrograph, it may be seen that spheroidization has taken place. This accounts for the reduced Brinell hardness of 145 Bhn and the ability of the steel to withstand the deformation.

A similar experience was encountered with plate composed of SAE-X1340. By heating for 3 hr at 1250 deg F, the Brinell hardness was reduced from 290 to 190 Bhn. Comparison of fig. 4 with fig. 5 reveals the marked change in microstructure resulting from the heat-treating procedure. As indicated by this structure, an improvement in working properties resulted.

In the foregoing examples of structural changes resulting from sub-critical annealing, the metallographic evidence would indicate that the cementite undergoes coalescence similar to that encountered in draw-tempering martensitic structures. Obviously, such factors as nucleation, thermal history, mechanical working and the chemistry of the metal have a bearing on the ability of carbon to react in this manner. Prior structure as governed by these factors can be regulated to a certain extent by a preliminary heat treating, such as normalizing. In some instances, therefore, it is necessary to normalize before annealing and thus assure proper results in the subsequent operation. If the material prior to annealing contains ferrite network that might be harmful, the sub-critical anneal alone would not be sufficient to eliminate the condition. This is borne out in the photomicrograph, fig. 3. Close examination of the microstructure in this figure and comparison with that in fig. 2, discloses the presence of a ferrite network which persists after heat treating. This condition is not of great importance in this particular case, but might become critical in some instances. It would seem logical to assume that if the material prior to annealing is in coarse lamellar pearlite form, greater time is required for coalescence due to the distance the carbide must migrate. The preferred prior structure to secure the most rapid spheroidizing would therefore, be one of "emulsified" pearlite or so-called troostite.

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FIG. 2 — Microstructure of SAE-1045 steel prior to heat treatment; Bhn 290. Nital etch and at 500X.

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Considerable experimentation with steels of different analyses indicates that the alloy content of the metal plays an important role in the rate of coalescence. It has been observed that it is easier to spheroidize straight-carbon steel than it is to produce the same degree of spheroidization in a steel containing alloys. It has also been observed that the microstructures formed in a sub-critical anneal of an alloy steel are not truly spheroidal, but more closely resemble dispersed fine lamellar pearlite. Even the small amount of alloying agents encountered in SAE-X1340 steel seemed to be sufficient to retard spheroidization. This is brought out by comparing fig. 3 with fig. 5. In fig. 3 the particles of carbide are clearly defined as small globules, whereas the spheroidal nature of the carbides in fig. 5 are poorly resolved at 500 diam, which may be attributed to the effect of alloys on previously mentioned factors controlling spheroidization. The lack of well-defined spheroids in alloy steels does not, however, minimize the advantages to be gained by this type of annealing.

After considerable experience with sub-critical annealing of hypoeutectoid steels, a method of securing spheroidized structures became evident. Bullens[1] has indicated that spheroidization can be accomplished by reheating to a point slightly below the lower critical of the steel, but no mention is made of the time element involved. He further points out that the prior form of the carbide is important in the securing of reduced

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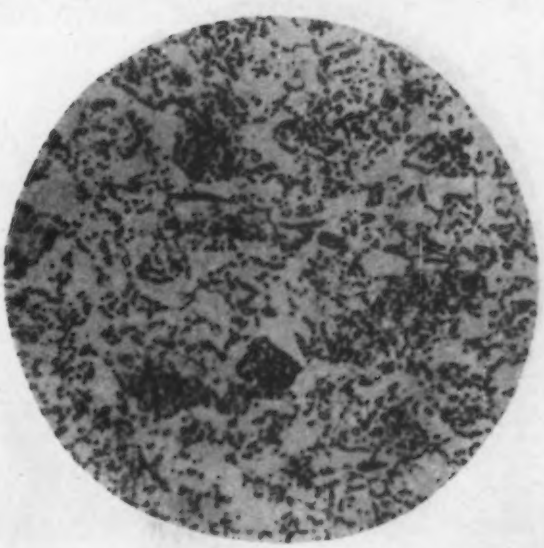


FIG. 3 — Microstructure of SAE-1045 steel after annealing for 4 hr at 1250° F; Bhn 145. Nital etch and at 500X.

o o o

FIG. 4 — Microstructure of SAE-X1340 steel prior to heat treatment; Bhn 290. Nital etch and at 500X.

spheroidizing time. These observations are in agreement with the results obtained. It is thus evident that spheroidization can be secured by first normalizing at a temperature just slightly above the upper critical and then reheating to a temperature in the neighborhood of the lower critical. By selecting a normalizing temperature slightly above the upper critical, the carbon tends to form into finely dispersed particles, whereas if the normalizing is carried on at elevated temperatures, cooling through the critical tends to produce a coarser carbide structure not conducive to rapid spheroidization.

In applying the principle of sub-critical annealing to one alloy steel, the problem of ductility became of secondary importance, since machinability was the property desired. A cast steel part with an analysis approximating SAE-4335 required machining before being hardened and drawn. The rough casting as-received had a hardness of over 300 Bhn and a poor machining structure. The prescribed annealing treatment called for a 1750 deg F normalize followed by a pack anneal at 1450 deg F with a slow cool to 1300 deg F and a 12-hr hold, also followed by a slow cool to room temperature. Variations in foundry practice and analysis often lead to erratic results with subsequent complaint from the machining department. It was not uncommon to find adjacent pieces, which were nested in the annealing box, exhibit as much as 150 Brinell points variation in hardness. Uniformity of hardness from part to part with better machining structure at a reduction in time and labor was consistently obtained through the use of a 20-hr sub-critical anneal replacing the long pack anneal procedure mentioned above. The hardness obtained by this method was 228 Bhn or less and the microstructure as shown in fig. 6 is typical of the resulting material. The high temperature 1750 deg F normalize was retained with the latter procedure, in order to break up the cast structure and afford uniformity.

Sub-critical annealing was also used to good advantage on steel of the following composition: Carbon 0.15 pct, nickel 4.06 pct, chromium 1.13 pct, manganese 0.33 pct, molybdenum 0.21 pct. The requirements on gears of this analysis called for a hardness not to exceed 235 Bhn. In view of the low carbon content, this specification did not appear to be too difficult to meet. Initial attempts to achieve this softness by furnace cooling met with lack of success. Extremely slow cooling in conjunction with spheroidizing arrests were also discarded because of unsatisfactory results. Several times, temperature, transformation procedures also failed to produce reliable results. A double heat treatment consisting of a 5-hr-1550 deg F normalize followed by a 40-hr-1250 deg F draw, produced a hardness of 150 to 190 Bhn and thereby solved the problem. In spite of the long time at temperature in the sub-critical annealing, the total annealing cycle was reduced materially over any others attempted and with more consistent results.

To date, the use of a sub-critical anneal at temperatures around 1250 deg F has been found to be very useful in solving many annealing problems. This furthermore has been accomplished at a cost saving over that of previously used methods. Experiments in the annealing of steels have included studies made with time-temperature-transformation processes as described by Payson[2]. While his proposed method of annealing lends itself to many applications, it is felt that sub-critical annealing in many instances can be used to good advantage, providing a careful analysis of the metallurgical problem is made.

Payson mentions in his treatise that tempering treatments are applicable and sometimes necessary for certain steels. He further states "The advantage of a tempering annealing treatment is its simplicity, since it involves merely heating to and holding at a sub-critical temperature, followed by a cooling in air." The simplicity of the operation is the crux of the matter and probably accounts for the reason that sub-critical annealing is too often over-looked. It is not the purpose of this article to imply that sub-critical annealing is a panacea for all annealing problems, for it

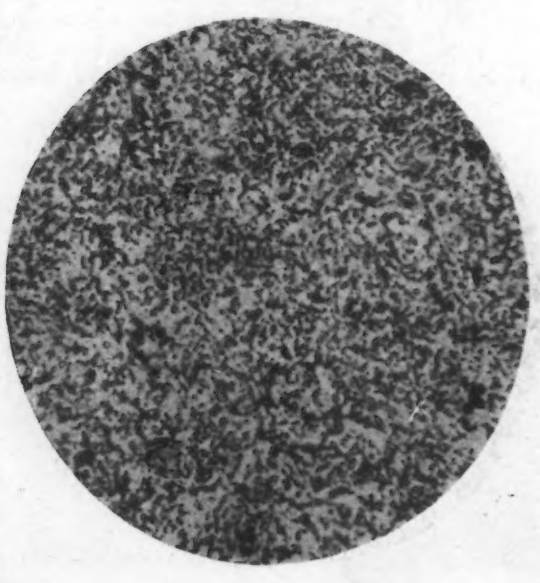


FIG. 5 — Microstructure of SAE-X1340 steel after annealing for 3 hr at 1250° F; Bhn 190. Nital etch and at 500X.

is evident that the data are lacking in regards to hyper-eutectoid steels and obviously incomplete for hypo-eutectoid ones. The advantages to be gained may be offset by those of other methods, as well as conditions to be met and equipment available in the heat treater's plant.

Particular mention has been made of the ease of temperature and atmosphere control which is afforded by this method. To this may be added, cooling rate. In only one instance has this factor been found to be of importance. When large pieces of light-gage plate are cooled too rapidly from the draw temperature, there is a tendency for warping to take place due to unequal cooling rates. This can be partially compensated for in the method of loading, but usually is better corrected by retarding the rate of cooling.

A few examples of the benefits derived from sub-critical annealing should serve as a guide toward the increased utilization of this heat treating process. Although no arbitrary rule can be set forth as to its adaptability for a specific annealing problem, a summary of the advantages to be gained may serve to govern the choice:

(1) Simplicity of operation.
(2) Elimination of atmosphere control.
(3) Freedom from decarburization effects.
(4) Wide latitude in operating temperature.
(5) Reduction in harmful scale formation.
(6) Lessens the effect of cooling rates.
(7) Affords a savings in equipment and time.

FIG. 6 — Microstructure of cast steel after annealing for 20 hr at 1250° F; Bhn 222. Nital etch and at 500X.

"*Steel and Its Heat Treatment*," by *D. K. Bullens, vol. 1, 4th edition.*
"*The Annealing of Steel*," by *Peter Payson*, THE IRON AGE, *June-July*, 1943.

Steel Castings Made by Thermit Process

DEVELOPMENT of a special type of thermit, known as Thermicast, for producing steel castings, has been announced by the Metal and Thermit Corp., New York. The new type of thermit is said to solve the problem of obtaining sound, clean steel castings quickly and simply, irrespective of size and intricacy of shape, when regular steel melting facilities are unavailable. Thermicast is especially designed for the production of steel castings and is not to be associated with conventional thermit welding for which it is not suitable.

The new casting material utilizes the well-known thermit reaction, which is carried out in a specially designed conical-shaped crucible of sheet steel lined with refractory material. Most of the equipment required to produce the castings can be improvised, and little experience to produce steel castings by the process is necessary.

Thermicast is available in 41-lb bags, each of which produces approximately 25 lb of steel. The Thermicast steel, as cast, has the following average mechanical properties: yield point, 39,250 psi tensile strength, 70,200 psi; elongation in 2 in., 30.1 pct and reduction in area, 51.2 pct.

Pouring Thermicast steel into ladle.

Induction Brazing And Soldering

. . . High-frequency induction heating can be fully controlled to carry out low-temperature brazing and soldering without damage to surfaces or components within containers. Induction brazing permits salvaging of cutting tools with minimum effects on hardness.

By H. U. HJERMSTAD

Vice-President, Federal Electric Co., Inc., Chicago

THROUGH flexibility of close control of heat, high-frequency induction heating possesses fundamental advantages in brazing and soldering operations. The heat can be closely controlled in one of the following ways, or by combinations:

(1) Varying the power input to the high frequency oscillator.

(2) Controlling the amount of energy that goes into the work by arranging the shape and proximity of the coil.

(3) Varying the time.

It will be found in soldering operations that all three variables frequently will have to be used in making setups.

Since the area heated by induction can be confined to a very narrow band, certain types of operations that heretofore were impractical due to the danger of destroying plating, finishes or electric components enclosed in sealed containers, can now be handled. Furthermore, in brazing operations, the amount of scale formation due to oxidization is very small, warpages are reduced and the amount is energy required to make a weld is kept to a minimum.

Induction heating acts very rapidly since it enables literally the dumping of large amounts of heat into a small area in an extremely short time. This characteristic can be easily brought out by a comparison. The maximum rate of energy transferred from a furnace whose walls are maintained at a temperature of 2000° F to a body which is at room temperature, is on the order of 3 Btu per sq in. per min. It is possible by induction heating to place a piece of steel in a properly designed induction coil and induce energy at the rate of 100 to 250 Btu per sq in. per min.

In order to have an even flow of metal between two surfaces, it is essential that uniform gaps be maintained between adjacent pieces of metal since the flow of brazing metal or solder is going to depend on capillary action. It will be generally found that a uniform, clean gap will result in a uniform joint; but the width of the gap is all important, since a wide gap can completely stop the flow of metal. The strength of all joints whether they are soft solder, hard solder, or copper, will be controlled to a great extent by the thickness of the bonding material, which in turn, is controlled by the gap thickness. The curve, fig. 1, shows the relationship of the thickness of joint to tensile strength of brazing alloys. It may be noted that on clearances of 0.001 in. to 0.003 in. maximum strength will be obtained from such brazed connections. Too small a gap will hinder capillary action and will result in a reduction of strength in the joint.

When using too large a gap, the strength of the joint is going to be dependent to a great extent on the tensile strength of the welding material. Clearances which are too close give bare spots, for the brazing alloy is unable to flow, but with the proper clearance maximum conduction of the fluid brazing metal due to the capillary action will be had. The effect of thickness of joint of soft solder to its tensile strength is shown by the curve, fig. 2. It will be noted here that quite high strength can be obtained from soft solder if the thickness of the solder joint is closely controlled and sufficient space is left for capillary action to take place.

Generally speaking, the technique used in silver brazing also applies to soft soldering. Frequently it is necessary in soldering operations to provide a seal which is sufficiently tight

FIG. 1—Relation of joint thickness to tensile strength of brazing alloys, based upon butt joints of stainless steel.

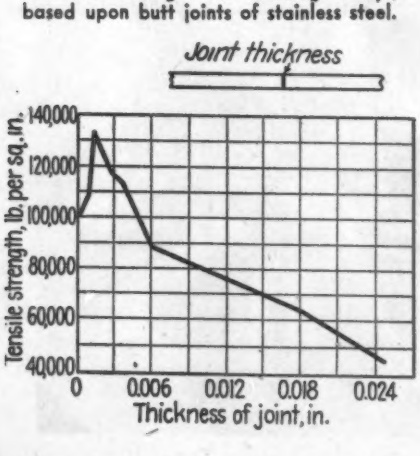
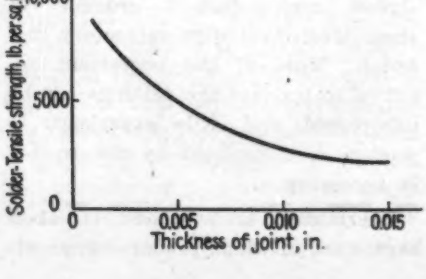
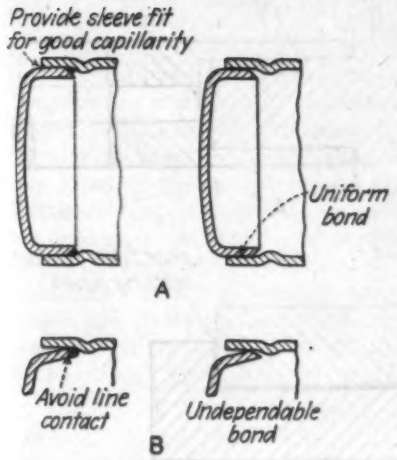


FIG. 2—Relation of joint thickness to tensile strength of soft solders.





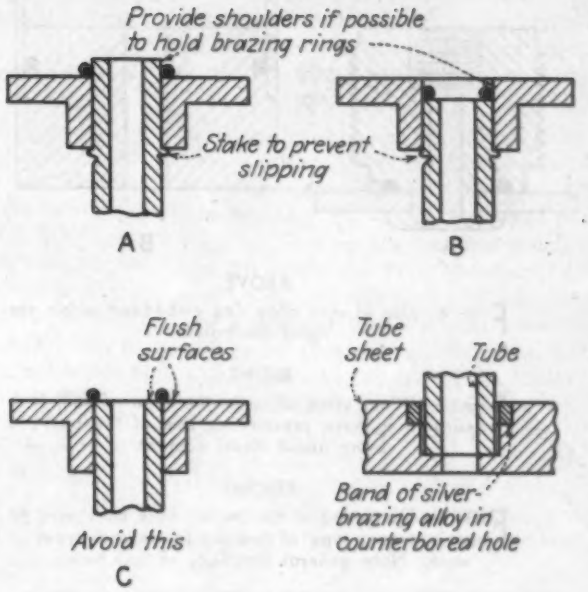
LEFT

FIG. 3 — A uniformly snug contact between the metals is important when silver brazing.

o o o

RIGHT

FIG. 5 — Methods of providing shoulders for solder and brazing rings.



at the bottom of the joint so as to act as a seal or dam to prevent the flow of solder through the joint. (See fig. 3a.) This is important when making solder seals on such items as condenser cans, transformers, etc., where there is danger that solder may be fluid enough to be conducted directly inside the enclosure.

The necessity of maintaining uniform fits throughout all joints that are to be brazed or soldered cannot be stressed too much. Fig. 4 indicates the effects of straight and rounded edges or corners.

The designer will find that induction heating can be used to the greatest advantage where only a few welds per item are to be made. If an assembly is to be made with several joints, it may be more advantageous to do such work by means of furnace brazing. Depending on the type of assembly the combination of furnace and induction heating is sometimes most helpful.

Solders

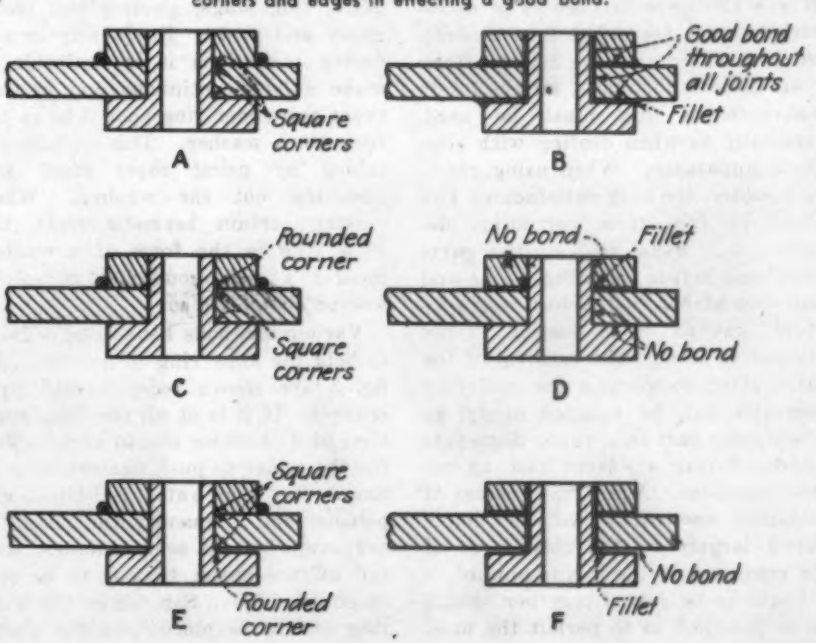
There is available at the present time a large variety of solders and silver solders for a broad range of melting temperatures. The use of a particular brazing alloy will depend upon the specific application and type of joint required. As is well known, melting points of solder can be varied greatly to suit applications by controlling the ratio of lead to tin. A silver brazing alloy melting at 1175° F is made up of copper, silver, zinc, and cadmium. It is the lowest melting silver brazing alloy available at the present time which is suitable for both ferrous and nonferrous metals. An alloy composed of copper, silver and phosphorus is recommended for use with nonferrous metals such as copper, brass and bronze. It has a melting temperature of 1300° F and is self-fluxing on copper.

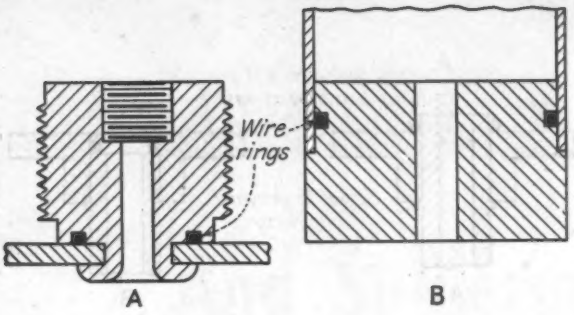
Other brazing alloys having higher melting points are brass, constituted of 60 pct copper and 40 pct zinc melting at 1650° F, and 70 pct copper and 30 pct zinc melting at 1750° F. Copper, which melts at a higher temperature, namely, 1982° F, is also utilized. Certain brazing alloys having a higher remelting temperature than the original brazing temperature are also available. This factor is definitely advantageous when subsequent operations are to be performed where the temperature of the second operation approaches that of the original melting point of alloy.

In all types of brazing and soldering it is usually necessary to employ some form of flux. The type of flux to be used varies greatly with the application and, of course, the type of brazing alloy or solder. Most brazing fluxes are some form of borax or borax plus boric acid. These will leave a residue after brazing which can be readily removed by scrubbing the part in hot water, or by pickling. Frequently it is desirable to quench the brazed parts directly after the brazing operation while it is still hot, since it will be found that the flux deposits will come off more readily at this time due to the action of the steam formed.

The subject of fluxes in connection with soldering is most important

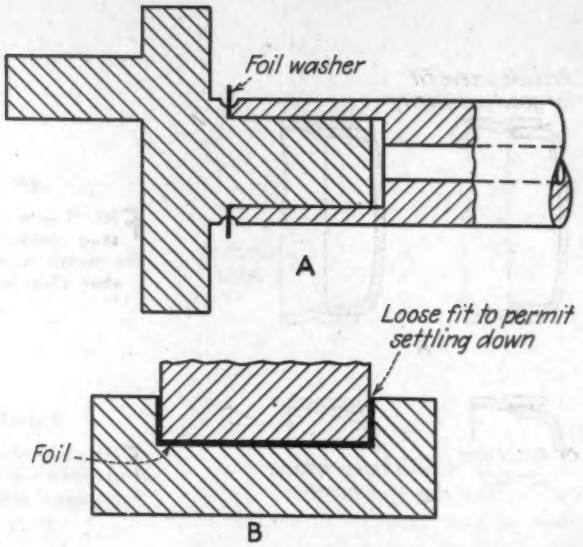
FIG. 4—Illustrating need of maintaining uniform fits throughout, and the effect of corners and edges in effecting a good bond.





ABOVE

FIG. 6—Use of wire alloy ring embedded within the joint illustrated.

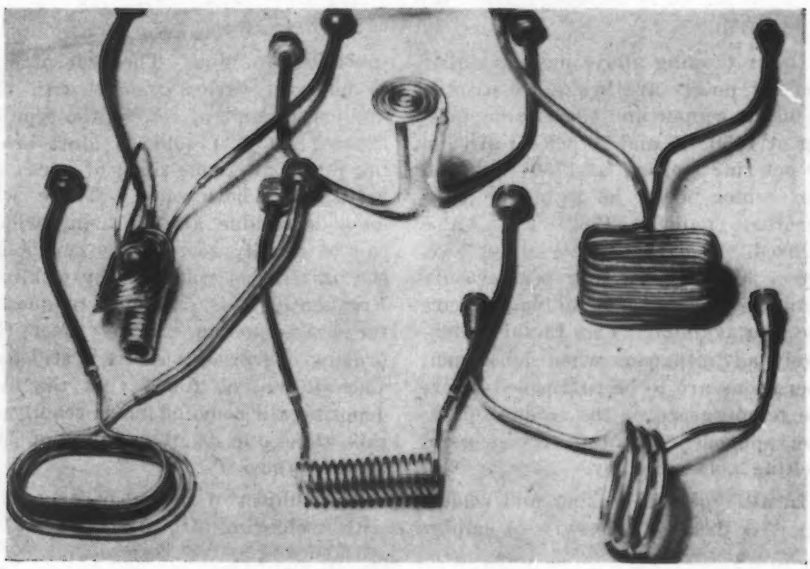


RIGHT

FIG. 7—When using alloy in the form of foil, it is desirable to have pressure on one of the parts to bring about closer contact.

BELOW

FIG. 8—Illustrating a number of work coils used to obtain proper type of heating for several types of work. Note general simplicity of coil forms.



since it is possible in a number of applications to use acid type fluxes. Where this type is used it is necessary to wash the object in a neutralizing solution to remove acidity. However, in most instances, an absolutely non-corrosive flux must be used, especially so when dealing with electrical apparatus. When using resin-core solder, the only satisfactory flux which is free from corroding elements, it is usual to have the parts tin plated before soldering. Zinc and cadmium plating will solder well provided that an oxide coating is not allowed to form. The removal of the resin after completing the soldering operation can be handled nicely by placing the part in a vapor degreaser and employing a solvent such as trichloroethylene. Again, the success of soldering operations will be determined largely by the cleanliness of the parts before the flux is applied.

Parts to be joined together should be so designed as to permit the most convenient use of solder or brazing alloys in any of the following forms: Wire, foil, slugs, electroplate, metal spray and paste. Frequently in soldering operations it is desirable to make a loop continuous and in that event the solder ring should be in the form of a washer. This is best obtained by using sheet stock and punching out the washer. When making certain hermetic seals, the alloy ring in the form of a washer insures a continuous flow of solder around the entire seal.

Various methods have been devised to hold the alloy ring in position. In fig. 5 are shown recommended procedures. If it is at all possible, some kind of a shoulder should be provided for the solder to push against since it has a very high rate of thermal expansion and frequently the rings, if not supported in some manner, will fall off the object that is to be soldered (fig. 5c). Sometimes the wire ring should be placed slightly above the joint so that when the metal melts it will flow down the wall of the tube and enter into the joint, being drawn in by capillary action. In some instances it will be found desirable to chamfer one part so as to assist the flow of metal into the joint. This will allow a greater tolerance in the size of the solder or brazing ring and will contribute to the ease of the assembly of the various metal parts. If it is required to place the ring above the work, make the ring slightly undersize in order that it will cling to the cylindrical part and stay in position. Fig. 6 illustrates the use of wire rings embedded within the joint. The use of foil in a brazed joint is shown in fig. 7. It will be found desirable to apply pressure to one part to bring about closer contact and to allow the excess brazing foil to flow out of the well.

The method of applying heat to the part to be brazed will depend a great deal on the type of materials and whether thick or thin sections are being joined. A good rule is to have sections of nearly equal thicknesses. However, the best method to follow when brazing different types of material and of different thicknesses, is to concentrate the magnetic flux on the section most difficult to heat, that is, to allow the part having the greatest mass or the lowest electrical resistance, to receive the largest amount of energy. Frequently it is easy to concentrate the heat on one part, and the second part is then heated entirely by conduction.

Coil Design

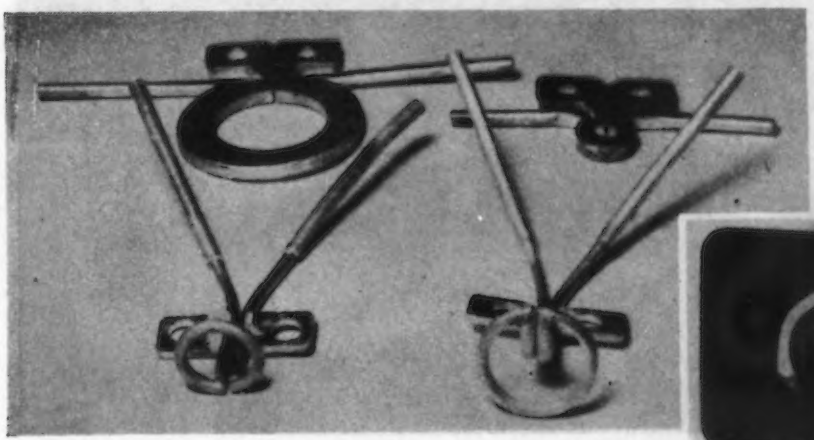
In designing coils it is well to allow for ample space between the heating coil and work. Usually a fairly large gap between the coil and work can be used when soldering and brazing, which will permit the work to be so

placed into the coil with the least amount of trouble. Care should be taken in making certain that the part to be brazed is centrally located within the coil so as to obtain even rise in temperature of the part. A rotating device is helpful in obtaining uniformity in heating, and is especially important in the case of a mass production item, since the induction heater can then be left on continuously. The coil should not be in close proximity with any sharp corners which are liable to burn due to excessive heating. This difficulty can be eliminated by having the coil follow the contour of the work. Use a few turns on the coil as possible since a large number of the fluxes are good electrical conductors and at high temperatures are liable to cause turn-to-turn short circuits on the induction work coil. The simplest type of coil is the best; complicated coil shapes make the job difficult and detract from the advantages inherent in induction heating. (See fig. 8.)

In many applications where the heating energy must be concentrated in a very small area, it is necessary to use single turn work coils (fig. 9). If the power concentration must be very great, it will be necessary to use a radio-frequency transformer to transfer the energy from the induction heater into the single-turn work coil.

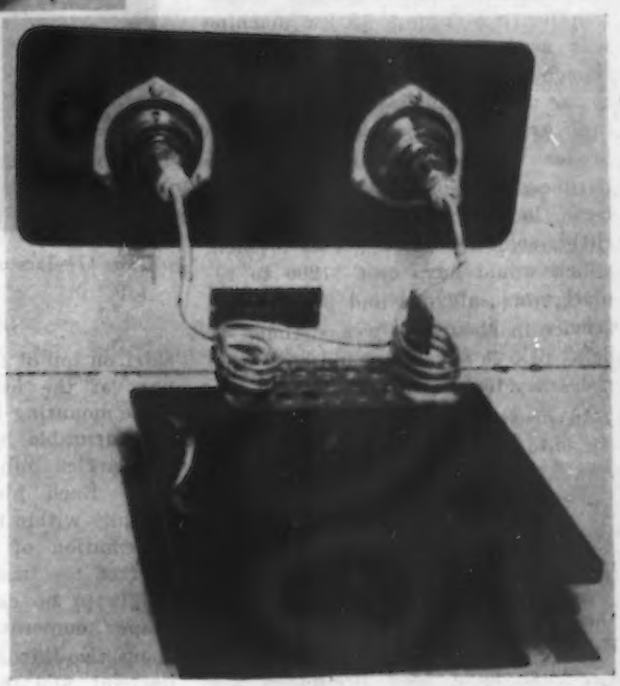
The use of a lift table that lifts the work up into the coil of the induction heater, where the entire heating cycle is automatic, is shown in fig. 10. All the operator has to do is to put the base in place on the locating pins on the lift table, and press the start button. The lift table then goes up placing the work into the coil and the induction heater is automatically turned on. At the end of the heating cycle, the lift table will stay in the up position for a determined length of time to allow the brazing alloy to set. It will then lower and the operator takes off the finished piece and puts on a fresh mounting bracket for brazing.

An interesting application of sil-



ABOVE

FIG. 9—For concentrating a great deal of energy in a small area, the single turn coil works best.



RIGHT

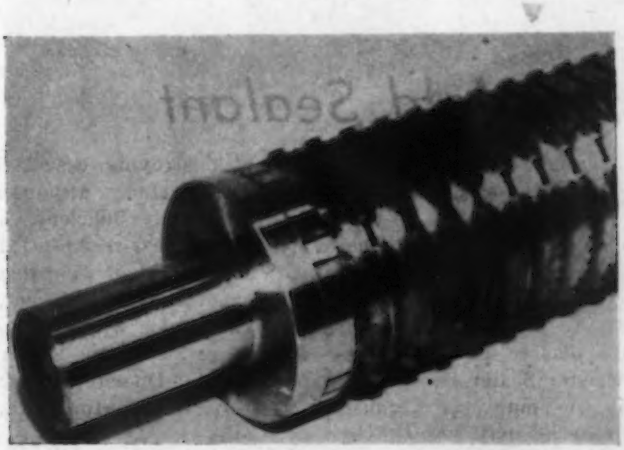
FIG. 10—An automatically controlled lift table which brings the work into the coil for a predetermined length of time.

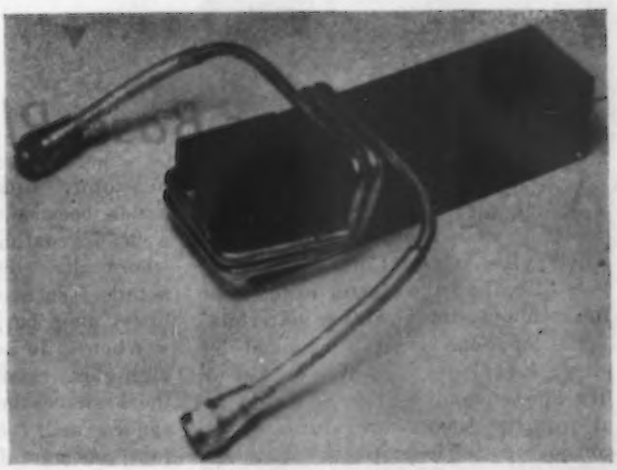
LOWER RIGHT

FIG. 12—Illustrating the design of a coil for brazing the tip of high-speed tool steel onto the shank.

BELOW

FIG. 11—This broach was salvaged by brazing the retriever shaft at the end of the broach, which had been broken off. The hardness in only one set of teeth was lost by this operation.





ver brazing was the salvaging of a large broach without affecting the temper of the cutting teeth. Fig. 11 shows the broach, measuring 4½ ft long and 5 in. in diam. The retriever shaft on the end of the broach had been broken off and the tool was useless. In attempting the salvaging operation the broken end of the broach was first ground flat and a new retriever shaft was turned out of ordinary cold rolled steel. The broach itself, however, was made of high-alloy tool steel and the problem was to weld or braze this new retriever shaft on the end of the broach without overheating the tool steel in the teeth of the broach itself. Any conventional methods of heating the end of the broach up to silver-brazing temperature would have resulted in loss of hardness of all of the teeth for about 6 in. The loss of this many teeth would have made the salvage impractical. High-frequency induction heating from a 15 kw machine was used to bring the end of the broach and the retriever bearing up to the temperature required for brazing, approximately 1250° F. The broach was heated so fast that the hardness was lost in only one set of teeth, located ½ in. away from the silver soldered joint. This broach, which would have cost $1200 to replace, was salvaged and put back in service in about two weeks' time. A delay of 6 to 8 weeks would have been necessary to get a new one.

In brazing a high-speed tool steel tip onto a shank, it is necessary to concentrate the heat in the shank of the tool in order not to overheat the tip. Fig. 12 illustrates a coil designed to accomplish this.

High economic production through the use of a turntable is shown in the setup, fig. 13. Rings of silver solder that have been pre-fluxed are placed around the circular header skirt on top of the washer that forms part of the mounting bracket. As these mounting brackets are placed on the turntable by the operator, they are carried into the induction heater coil. Each piece is rotated individually within the coil to insure even distribution of the heat. The top part of the bracket where the brazing is to be done comes up to the proper temperature after the piece is about two-thirds of the way through the coil, and the silver solder flows through the joint freely as it passes out of the coil. After leaving the coil the part cools enough to set the silver solder before the piece reaches the wipe-off arm, which automatically removes the bracket from the turntable dropping it into a chute that guides it into a container.

FIG. 13—Turntable arrangement with this 5 kw Fedelco induction heater made possible the brazing of 1000 brackets per hr.

With a 5 kw induction heater it is possible to operate this turntable to have an output of about 800 to 1000 pieces per hr. Based on a 1c per kw hr rate, the cost of the power and tube replacement would be about 15c for each 1000 units brazed.

▼ ▼ ▼

Resinous-Base Plaster Mold Sealant

A RESINOUS-BASE thermosetting plastic, known as "Plaster Sealer," now is being used by Consolidated Vultee Aircraft Corp. for the purpose of sealing the plaster molds used in casting plastics and other materials.

Plaster Sealer can be applied by either spraying or brushing on wet or dry plaster, and it dries in 3 to 4 hr at ordinary room temperatures. It is considered superior to the lacquers heretofore used in sealing plaster molds, because it does not necessitate a heavy coating on casting surfaces where close dimensions and minute details (such as layout and trim lines) must be preserved.

When it is necessary to produce a high-gloss casting in a plaster mold, the basic coating of Plaster Sealer is sanded and recoated. As many as four coatings of the material may be utilized without destroying essential details on the mold surfaces, although two coatings are usually sufficient.

The new plastic is heat-resistant at temperatures of more than 2500 deg F. While it is normally translucent, it can be dyed any color without losing its effectiveness. Plastic Sealer is being produced by Duorite Plastic Industries, 8564 W. Washington Blvd., Culver City, Calif.

Gas Cutting of Stainless Aided by Fluxing System

STAINLESS steel may now be cut by the oxyacetylene torch almost as readily as mild steel as the result of the development of a flux-injection process by the joint efforts of the Air Reduction Co. and the Rustless Iron & Steel Corp. Because the very elements which give stainless steels their desirable properties produce oxides which are extremely tenacious, when attempts are made to cut such steels with oxygen, the slag produced is viscous and tends to create a refractory layer which prevents the heat and gases from reaching fresh layers of metal. The solution to this vexing problem has been to provide a fluxing material in the gas stream which reacts with the oxides of chromium and nickel in particular to form fluid slags which are more readily washed out of the kerf.

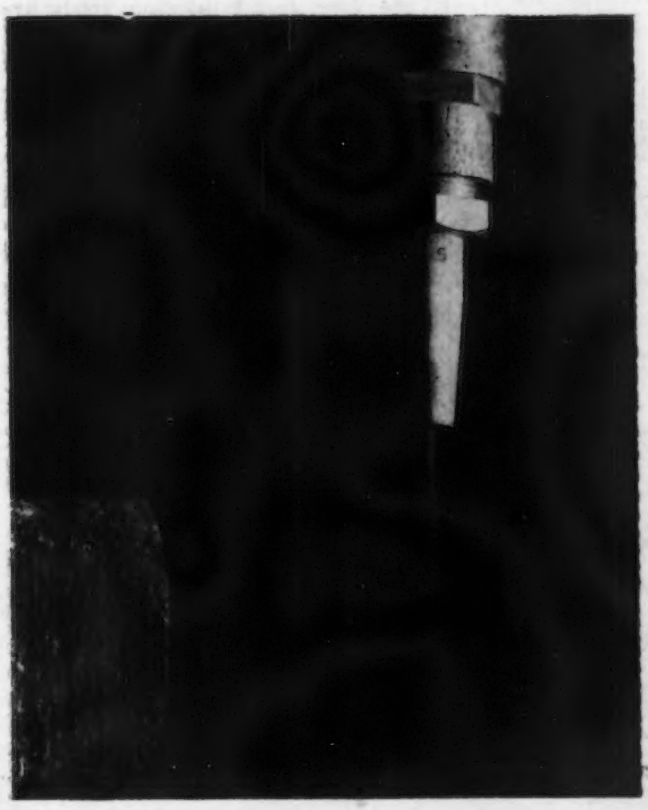
In a recent demonstration at the Air Reduction Laboratories, a 1-in. plate of 18-8 plus 3 pct Mo stainless was machine cut successfully at the rate of 8 in. to 9 in. per min, using the new Airco flux-injection process. A 2½-in. slab of 25-12 stainless was similarly cut at the rate 3½ in. per min, leaving a relatively smooth-faced kerf. The crop end of a 5-in. slab was removed with somewhat greater difficulty, particularly at the start. Tests made without the flux failed to produce a cut.

Except for the addition of the fluxing apparatus and a slight modification in the oxygen control, standard equipment is used throughout. In cutting the 1-in. stainless steel plate mentioned above, for example, a standard three-hose torch and a No. 3 tip was employed, attached to a standard Radiagraph traversing unit for straight cuts. The only auxiliary apparatus was a flux dispenser and remote-controlled solenoid-actuated valve for quick cut-off of the oxygen before it passes through the fluxing unit. Hand control of the acetylene is maintained on the torch handle. Either hand or machine cutting can be employed.

The flux employed in the process is a mixture of inexpensive chemicals used in dry powder form. It is fed into the oxygen hose line by screw feed injector from the bottom of a cylindrical container, the contents of which are kept agitated by a motor driven impeller to prevent cavitation of the powder. Variable speed is provided the feed motor, although experience thus far has shown that flux consumption remains substantially the same at approximately 1 oz per min of operation for cutting thicknesses from 1 in. to 5 in. The flux unit has a capacity of 35 lb, providing enough flux for 5 hr continuous operation. It weighs 75 lb so that it can be moved about from job to job as required in the foundry or steel mill.

The relatively inert nature of the flux should assure trouble-free operation in the injection system as well as lending long time storage characteristics to the flux itself. Possibility of the oxygen lines and particularly the tip becoming clogged with powder is largely overcome by placing the oxygen cut-off valve ahead of the flux dispenser instead of on the handle of the torch. Abrasive wear in the valve is also obviated.

Developed originally to cut risers off ingots and castings, the Airco flux-injection process is foreseen to have application for quality cuts up to 3 in. thick and rough cuts in considerably heavier pieces of austenitic stainless steel of the 18-8, 18-8-3, 18-12-3 and 25-12 varieties.



o o o

LEFT

FIG. 1—Flux stream seen leaving the torch tip prior to lighting the acetylene preheating flames. In cutting a 2½-in. slab of 18-8 stainless a conventional torch and tip is used with normal preheat.

o o o

RIGHT

FIG. 2—Quality of the cut made with the Airco flux-injection system. Total elapsed time to complete the cut on a slab of 18-8 stainless 2½ in. thick by 10½ in. long was 3 min. Operating conditions are approximately the same as required for quality cuts in ordinary steel.

o o o

Titanium in Chrome-Manganese

THE properties of the manganese-chromium stainless steels have been rather extensively studied in recent years, especially abroad, where nickel has been scarce. But practically nothing seems to have been published, at least in this country, on the effects of titanium in steels of this nature. Interesting discussions of the general subject were published in 1943 by Parks and Mack*, but about the only reference to titanium is Parks' concluding statement that "the influence of small amounts of titanium, etc., is not too well known."

Metals and Alloys, February 1943, *vol.* 17, *p.* 330; *November* 1943, *vol.* 18, *p.* 507.

This statement led to a decision to make the tests here reported.

Since the articles referred to include excellent reviews of the literature based on copious bibliographies on the high-manganese stainless steels, no further discussion of the general subject seems necessary now.

In view of the past knowledge it was decided to confine this investigation to steels containing about 17 pct manganese and 12 pct chromium, which should be entirely austenitic. The bars tested were forged from 17-lb ingots melted in a basic-lined induction furnace, using as melting stock electrolytic iron and manganese, as well as some steel scrap and low-carbon ferroalloys. The non-titanium steels were deoxidized with aluminum, and the alloys used as sources of titanium contained appreciable quantities of aluminum also. The chemical analyses of the steels tested are given in table I.

These steels, except No. 8, were forged at about 2000° F to ⅞-in. round bars, and finished quite hot. No. 8, however, could not be forged, at least at that temperature, and broke up under the hammer so that the fragments could be used only for hardness tests.

Small specimens cut from the ⅞-in. round bars were quenched in water from various temperatures including and between 1800° and 2300° F to determine the quenching temperature giving the lowest hardness, and also the microstructures. The four steels with less than 0.2 pct titanium showed only irregular changes in hardness between about 86 Rb and 92 Rb, and no ferrite in their microstructures. The results obtained from the four higher-titanium steels are given in table II.

It may be seen in table II that as the titanium, or the quenching temperature with over 0.7 pct titanium, increases, the ferrite in the microstructure increases. The hardness generally decreases as the quenching temperature rose from 1800° to 2000° or 2100° F, but in all the steels except No. 6 the maximum hardness was reached after quenching from the highest temperature, 2300° F, when the greatest amount of ferrite was formed. From these results it was decided that a quenching temperature of 2100° F gave the lowest hardness, and specimens for tensile and impact tests were quenched from that temperature. Later some additional specimens for tensile tests were quenched from 2200° and 2300° F respectively.

The same small specimens that were quenched from 1900°, 2100°, or 2300° F were tempered for 1 hr consecutively at 200° intervals from 400° up to 1600° F, with Rockwell hardness tests at each stage. Again the

TABLE I

Chemical Compositions of Test Specimens

Steel No.	C	Mn	Si	Cr	Ti	Ti/C
1	0.117	16.60	0.12	11.34	....	0
2	0.115	17.60	0.15	11.79	....	0
3	0.100	16.84	0.12	11.76	0.12	1.2
4	0.092	17.52	0.15	11.76	0.14	1.5
5	0.132	17.28	0.44	11.66	0.74	5.6
6	0.102	17.72	0.35	11.99	1.01	10.0
7	0.100	17.39	0.31	12.26	1.61	16.0
8	0.090	17.36	0.27	12.29	3.15	35.0

TABLE II

Hardness and Microstructures of Quenched Specimens Not Tempered

Quenching Temperature, °F	Property Reported	Steel No. 5, 0.74 pct Ti	Steel No. 6, 1.01 pct Ti	Steel No. 7, 1.61 pct Ti	Steel No. 8, 3.15 pct Ti
1800	Ferrite Rb	87 to 89 None	89 to 91 1 pct	93 to 95 3 pct	94 to 96 60 pct
1900	Ferrite Rb	89 None	89 to 91 3 pct	88 to 90 35 pct	90 70 pct
2000	Ferrite Rb	88 to 89 None	87 5 pct	90 to 91 50 pct	96 to 97 85 pct
2100	Ferrite Rb	91 None	85 10 pct	92 to 93 80 pct	90 to 92 85 pct
2200	Ferrite Rb	91 to 92 1 pct	89 to 90 30 pct	89 to 92 100 pct	103 to 104 100 pct
2300	Ferrite Rb	96 to 97 10 pct	87 to 89 60 pct	95 to 96 100 pct	105 to 108 100 pct

Stainless Steel

By G. F. COMSTOCK
Chief Metallurgist, Titanium Alloy Mfg. Co., Niagara Falls

. . . Interest continues to grow in the manganese-chromium stainless steels which contain no nickel. This research points out the valuable role of titanium in the austenitic 17 pct manganese 12 pct chromium stainless steels, a role which heretofore had been only in part surmised.

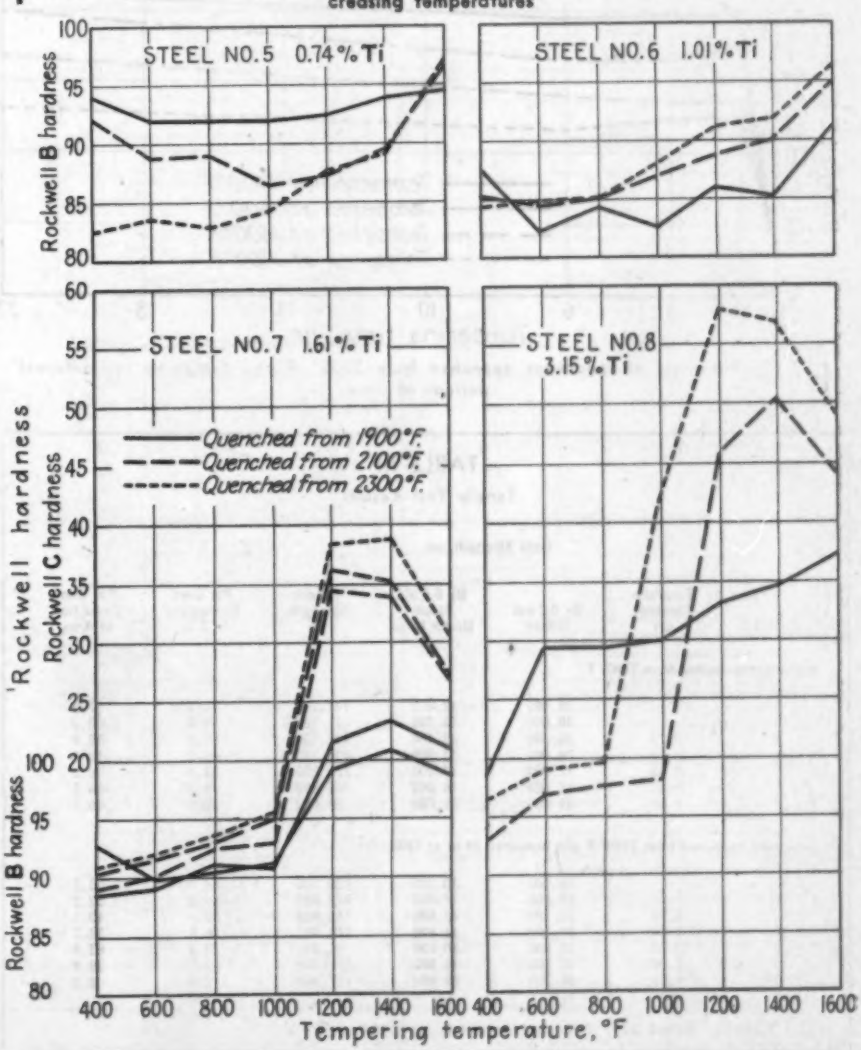
steels with less than 0.2 pct titanium showed no consistent changes in hardness, giving values in most instances between about 83 Rb and 91 Rb. The hardness variations on tempering the steels with over 0.7 pct titanium are plotted on fig. 1. Temper hardening is seen to be important only in the steels with 1.6 pct or more titanium and to be greatest in specimens tempered to at least 1200° F. Two of the curves for steel No. 7 are shown in duplicate, indicating how closely the results from specimens quenched and tempered separately checked each other. Every point plotted on fig. 1 represents the average from two or more hardness tests.

Since the tempering represented in fig. 1 was cumulative, without using separate specimens for each temperature, and the period of tempering at each temperature was only 1 hr, it seemed advisable to check the results at the higher tempering temperatures using separate specimens for each temperature and determining the changes in hardness with varying periods of time up to about 24 hr. This was done with small slices cut from the ends of the tensile and impact bars that were quenched in water after 1 hr at 2100° F. Tempering temperatures of 1400°, 1500°, 1600° and 1700° F were tried with steels Nos. 5, 6, 7, and one of the low-titanium steels No. 3, the high titanium steel No. 8 not being available in bar form. The results are plotted on fig. 2.

Steels Nos. 5 and 6 with 0.74 pct to 1.01 pct titanium are seen in fig. 2 to temper harden only a very little more than steel No. 3 with only 0.12 pct titanium, but the increase in hardness occurs chiefly within 6 hr in No. 5 and No. 6, while No. 3 shows no hardening until after 6 hr tempering. In steel No. 7 with 1.61 pct titanium temper hardening occurred within the first hour, with a slight subsequent increase and no decrease in hardness within 22 hr at temperature. The maximum hardness obtained, however, was about five points Rc lower than by the cumulative tempering method as reported in fig. 1. It was decided from these results that about 24 hr tempering would be best, and that 1400° F was the best temperature for steel No. 7 and 1500° F for the others.

Tensile test specimens were quenched in water after 1 hr at 2100° F, and one specimen of each steel was tested in that condition, another being tested after tempering 24 hr at 1500° F. (Except 1400° F for heat No. 7.) The specimens were made with

FIG. 1—Hardness of quenched specimens after tempering 1 hr consecutively at increasing temperatures



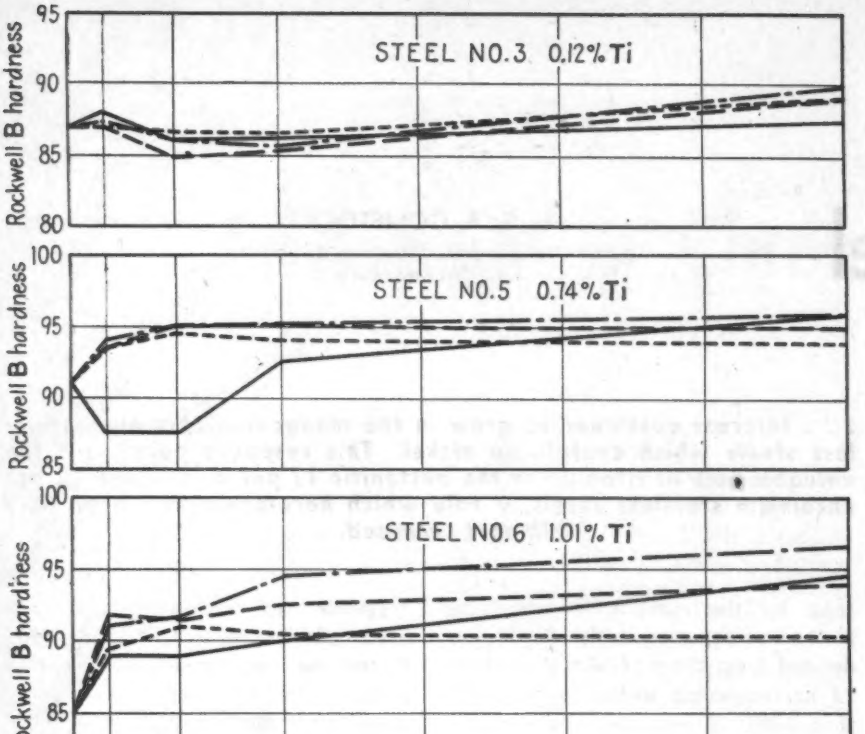


FIG. 2—Hardness of specimens quenched from 2100° F and tempered for different periods of time.

TABLE III

Tensile Test Results

Steel No.	Titanium Content, pct	Yield Strength, psi: By 0.2 pct Offset	Yield Strength, psi: By 0.5 pct Strain Under Load	Tensile Strength, psi	Per Cent Elongation in 2 in.	Per Cent Reduction of Area
Specimens quenched from 2100° F:						
1	....	28,900	33,400	141,200	76.0	57.2
2		30,500	33,700	121,200	60.0	63.3
3	0.12	30,300	35,400	136,100	60.0	55.8
4	0.14	28,000	33,800	133,100	60.0	56.4
5	0.74	32,700	37,300	125,200	54.0	58.6
6	1.01	44,600	46,600	102,900	43.0	56.6
7	1.61	49,000	51,700	88,000	39.0	65.7
Specimens quenched from 2100° F and tempered 24 hr at 1500° F:						
1	....	25,500	30,100	130,000	63.0	53.3
2		26,600	31,000	119,300	60.0	52.2
3	0.12	35,200	42,600	135,000	52.0	49.1
4	0.14	34,100	41,600	119,000	56.0	58.2
5	0.74	48,500	50,100	90,300	28.5	63.6
6	1.01	45,300	46,500	116,300	42.5	38.4
7*	1.61	65,700	69,900	117,900	2.5	3.2

* Note: Steel No. 7 was tempered at 1400 deg. F.

threaded ends to fit spherical-seated grips in the testing machine, and the load was applied in increments of 250 lb, taking extensometer readings at each increment to the nearest 0.00005 in. These values were plotted against the load to determine the yield strength by two methods, either at 0.2 pct offset, or at 0.5 pct strain under load. The results are reported in table III.

In table III it is seen how titanium raises the yield strength of these steels; in the quenched condition about 1 pct titanium seems to be required for a marked increase in yield strength, and while this improvement is accompanied by lower tensile strength and elongation, the reduction of area is not impaired. In the tempered condition, the highest yield strength with 1.61 pct titanium is attained at the cost of too great a reduction in ductility, but with 0.74 pct or 1.01 pct titanium the yield strength is much improved over the non-titanium steel with quite satisfactory ductility. Even with only 0.12 pct or 0.14 pct titanium there is about 30 pct improvement in yield strength without appreciable reduction in the other tensile properties. Titanium is therefore found to produce a consistent and important improvement in the yield strength of this kind of stainless steel.

Some additional tensile tests were made on steels Nos. 2, 4, 5 and 6 with specimens quenched from 2200° and 2300° F respectively, and tempered 24 hr at 1500° F. These results are reported graphically on fig. 3, together with those obtained after quenching from 2100° F. Unfortunately in two instances, as indicated on fig. 3, the ductility values were adversely affected by pipe in the specimen, or by breaking at the fillet due to faulty machining.

The variations in quenching temperature had in most instances only a minor influence on the tensile properties. Steel No. 5 with 0.74 pct titanium shows the greatest increase in yield strength due to tempering, but steel No. 4 with only 0.14 pct titanium also shows some increase, while steel No. 2 with no titanium does not. In steel No. 6 with 1 pct titanium the yield strength is higher as quenched than in the other steels, and increases on tempering only after quenching from above 2100° F. Steel No. 4 with 0.14 pct titanium has the highest tensile strength and also very good ductility, but all these steels were highly ductile except when the test speci-

mens were defective. The specimens of steels Nos. 5 and 6 were only slightly magnetic at the thread, and were apparently therefore chiefly austenitic like the lower titanium steels, but they became strongly magnetic at the gage length after testing.

Standard Impact Tests

Izod impact tests were made on these steels with standard specimens quenched from 2100° F with and without subsequent tempering for 24 hr at 1400° or 1500° F. The tests were made in triplicate, at room temperature, and using a 200 ft-lb blow. The results are reported in table IV. The tougher specimens did not break, and some of them even stopped the pendulum entirely.

These notched-bar impact results are in very good agreement with the reduction of area values in table III. All the quenched specimens not tempered have satisfactory impact resistance. The temper-hardened steel No. 7 with 1.61 pct titanium is probably too brittle for practical use, and steel No. 6 with 1.01 pct titanium also has questionable toughness when temper-hardened; but the steels with 0.74 pct or less titanium are tough whether temper-hardened or not.

Summary and Conclusions

Titanium in even small amounts is shown by this work to have a very useful effect on 17 pct manganese 12 pct chromium stainless steel in raising the yield strength. Even with as little as 0.14 pct titanium the yield strength is increased appreciably, or 15 pct to 20 pct when tempered after quenching. With about 0.75 pct titanium a yield strength above 48,000 psi is developed in this steel by heat treatment alone, comparing with a normal value of about 32,000 psi in ordinary stainless steel not cold-worked. And with this higher yield strength, the ductility and impact resistance are not impaired, the hardness being not much greater. With about 1 pct titanium, the yield strength is almost up to the same high value in the quenched condition without tempering, and on tempering the ductility and notch toughness are decreased. With still higher titanium contents, up to 1.6 pct or 3 pct, hardness values of 40 Rc to 60 Rc can be obtained by temper hardening, but such steels are either not forgeable or lacking in notch toughness.

Temper-hardening of these steels with titanium is thus not specially attractive, for with less than 1 pct

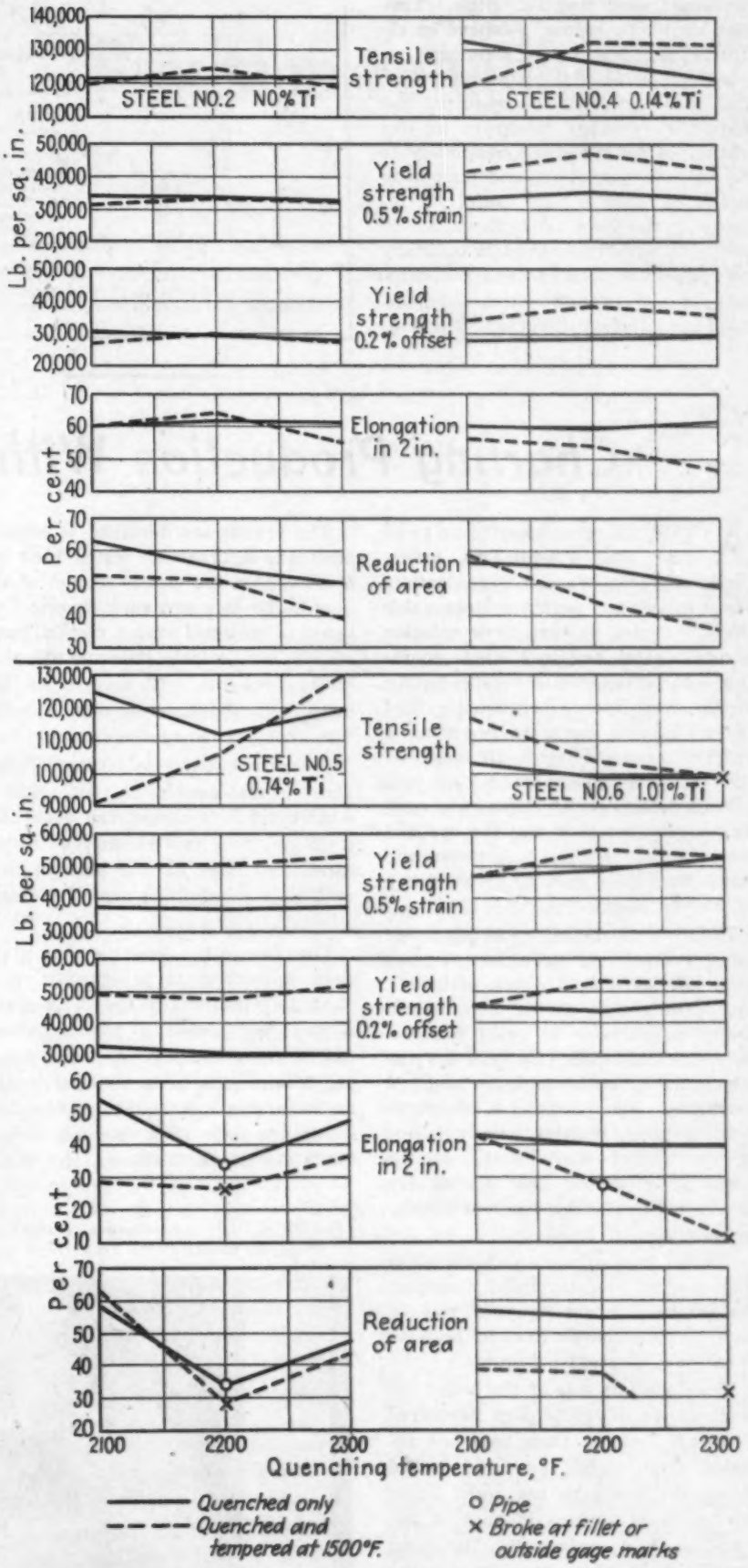


FIG. 3—Variation of tensile properties of quenched and tempered specimens with the quenching temperature. Full lines = quenched only. Broken lines = quenched and tempered at 1500° F.

titanium there is but little increase in hardness, and with more titanium the hardened steel may be brittle. Temper hardening seems to depend on the formation of a ferrite structure, replacing the normal austenite. With less titanium than is required for temper-hardening, however, or for changing the structure completely to ferrite, the quenching and tempering heat treatment is very useful for increasing the yield strength values 20 pct to 50 pct higher than in ordinary non-titanium stainless being obtainable in the titanium steels by heat treatment alone without cold working.

TABLE IV
Izod Impact Test Results

Steel No.	Titanium Content, pct	Quenched from 2100° F		Quenched and Tempered at 1500° F	
		Ft-Lb	Average	Ft-Lb	Average
1	....	190-192-198	193	117-124-129	123
2	....	198-198-198	198	110-118-125	118
3	0.12	135-175-165	158	68- 70- 70	69
4	0.14	126-175-159	153	76- 65- 70	70
5	0.74	82-120-105	102	110- 92- 87	96
6	1.01	72- 90-100	87	15- 15- 15	15
7*	1.61	137-144-161	147*	5- 2- 2	3

* Note: Steel No. 7 was tempered at 1400 deg F, and in the specimen not tempered the notches were less sharp than in any of the other specimens.

Charting Production With Peg Board

A VISUAL production control chart, the Produc-Trol, manufactured by the Wassell Organization, Westport, Conn., portrays measurable characteristics so that their relation one to another and to a whole operation can be immediately apprehended by the eye. Boards are usually used in series, each board representing a different type of control. By means of the graphic presentation on the boards, delinquent situations are spotlighted, so that they flag the eye and get attention in time to prevent any single item from holding up an entire production line.

Produc-Trol boards are made of black composition material punched with 200 horizontal rows of small, equidistant holes, 20,000 to a board. Every second row is ruled horizontally, thus allowing two lines for the scheduling of each operation and 100 operations per board. A calendar heading strip, relative to any period of time desired—days, weeks, months—extending across the top of the board relates directly and specifically to each row of holes.

Plastic pegs of various colors and shapes with predetermined meanings are inserted into the upper row of each of these double lines of holes to graphically present schedules.

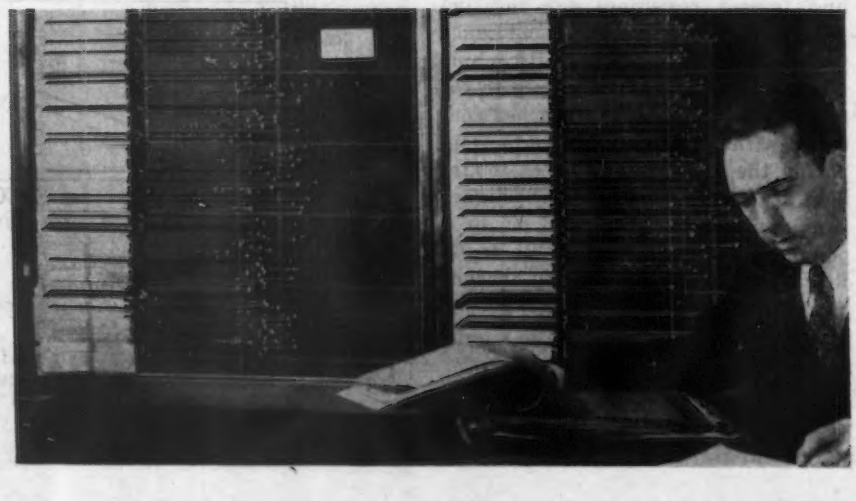
Down the left side of the board extends a row of white pegs numbered 1 through 100. As these pegs are unreeled from their slots and pulled across the board to the right (they are coiled on springs in back of the board) they represent "progress lines." These white pegs fit into the lower row of each horizontal pair of holes, immediately beneath each scheduling line, and provide comparison of progress against plans.

The boards are designed to expand auxiliary information which need not be shown on the visible section of the board. To this end each Produc-Trol board is equipped with a vertical bank of 100 semi-visible index cards running down the left margin of the board. On these cards may be noted facts for permanent reference.

A vertical string called the "Today Line" is also used to call attention to what must be accomplished each day. Each day it is moved one hole to the right, and flags all the pegs in that vertical row of holes which indicate scheduled operations.

The men in the machine shop start work according to a schedule preplotted on the control board. A green square peg means a job has been passed along to them. A round green peg means it is to be finished in the machine shop. A square yellow peg shows the date when the job should reach the assembly floor, etc. When jobs come in with higher priority rating than work already going through the plant, the switchover can be made without losing track of what has gone on previously. The peg board also helps check cost figures since hours are charged against every machine and cost must be minutely checked. The board is also useful when for some reason or other a job has to be "frozen," due to change in design. A pink peg goes in the date hole on which the work stopped. A red peg explains to management that certain parts must be replaced, as imperfections have developed. The board also helps management check up on subcontractors and deliveries when this group does not send the parts on time, as a specifically colored peg records this information graphically. A "trouble" line is maintained which goes back as far as the earliest trouble spot. As long as there is anything undone or waiting, the line stays at that point.

PRODUCTION is kept under constant surveillance at the Watson-Stillman Co., Roselle, N. J., by means of the Produc-Trol visual control system.



Precision Founding

. . . The making of the master pattern and matrix is analyzed in detail in this fifth of a series of articles on the theory and practice of precision casting.

o o o

By FRANCIS DITTMAR
Metal Products Consultant, Buffalo

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THROUGH progressive stages involving a number of try-patterns a round dozen answers are arrived at, these constituting the factors upon which rest the conclusions regarding all castings made by either the centrifugal or the vacuum process.

Nine of these factors have been discussed in preceding chapters in connection with centrifugally casting, a 3-in. ring in yellow brass. These nine were:

(1) The correct number of gates and their size.

(2) The composition of the mold as this relates to the finish of the casting.

(3) The density of the mold structure in regard to its resistance to centrifugal pressure.

(4) Table speeds in spinning the mold.

(5) Baking time of the mold.

(6) Shrinkage of the mold after baking.

(7) Heat of the mold at time of pouring.

(8) The effectiveness of the venting.

(9) The shrinkage of the metal.

The remaining three factors would be:

(10) The temperature of the metal at time of pouring.

(11) The shrinkage of the master matrix.

(12) The shrinkage of the wax pattern.

Temperatures of metal at pouring time will be considered next week, and the shrinkage of the matrix and its product, the wax pattern for the 3-in. ring, will be the concern of the following paragraphs.

In the present problem, a flexible matrix is to be used because in this instance such a matrix would be the simplest, swiftest and the cheapest solution. In cases where wax is to be injected under pressure, particularly where patterns are small and of intricate design, a matrix of metal will have to be used because of the greater rigidity needed. This would then either be a tool room procedure, and therefore expensive because of the greater accuracy and the finish required, or the matrix would be cast in some low-fusing point alloy.

Such a matrix may be made from a pure rubber compound of either the vulcanizing or of the air-curing variety, or from reclaimed rubber in its masticated form.

Where a long-lasting flexible matrix is wanted, the first choice would be a pure rubber compound with a slow hardening agent, as found in the compound requiring vulcanizing. The next choice would be a rubber compound of the air-curing variety. Both kinds are used in tire repairs and should be readily obtainable from any tire manufacturer at a reasonable cost. The third choice is reclaimed rubber in its masticated form which today may be procured from any firm in the rubber reclaiming business.

Since a discussion of pure rubber compounds would be rather idle at the present time owing to their scarcity and also, because the preparation and the vulcanizing of the first two compounds just mentioned is identical with that of reclaimed rubber, further discussions might as well be confined to the latter.

Reclaimed rubber in its masticated form is cut into small pieces and dissolved in benzol until a thick sticky paste results. This paste is then laid on the pattern with a nonmetallic spatula—a flat stick of wood will do—until a layer of paste about 3/32-in. thick has been built up. The pattern is then suspended at some suitable point by a wire and hung up to allow the benzol to evaporate. Except for the vulcanizing, that is all there is to it. The customary practice is to let the paste covered pattern hang overnight to get rid of the benzol whereupon, in the morning, it is cured in a vulcanizer for 45 min at a temperature of 260° F and at a pressure of 58 lb.

Since a rubber matrix, like the glue mold, needs to have external keys in order to locate it exactly in its mantle —see Fig. 5—and since the rubber paste has a tendency to run and stretch during its benzol evaporation stage, it is not practicable to mold the matrix locating keys at this time. These two keys are to be made separately and stuck on the matrix just prior to vulcanizing.

Into a block of plaster that has been dried, a V-shaped groove is cut of sufficient length and stopped at either end. This is then filled with rubber paste and let it set overnight. In the morning when the paste has stiffened so that it can be handled, cut the two keys from this rubber cast and attach them with rubber cement to the outside of the rubber matrix before it is vulcanized. As on the glue mold, the two V-shaped keys ought to be opposite each other.

The entire process is quite simple and should not, aside from the long time it takes to get rid of the benzol, take more than several hours.

(Note: Benzol dissolved rubber is highly explosive. Hence the nonmetallic spatula. Great care must be taken to eliminate all danger of sparks of either static or mechanical origin. Use glass or crockery mixing bowls. The room in which such work is done ought to be a separate one, well ventilated and if possible have a wooden floor. If these precautions are

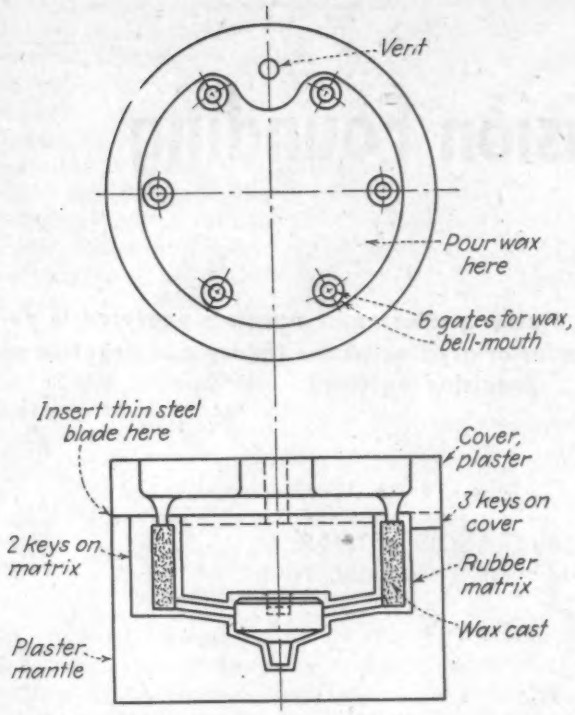


FIG. 20—Wax is poured through a depression in the mantle (cover). Note how gates are formed at bottom.

heeded the material is as safe as flour-dough.)

No plaster or any other kind of pattern made from a porous material can be used in making matrices requiring vulcanizing. The heat of the vulcanizing process expands the aircontent in such patterns and causes air bubbles to form on their surfaces which are reproduced in the matrix; hence, the use only of metal patterns.

Matrices of rubber compounds, while long lasting and simple to make, have a high shrinkage factor owing to the tension or "nerve" inherent in rubber, although this tension is considerably less in the reclaimed material. It may, therefore, be necessary to make several matrices from an over-sized pattern before correct dimensions of the wax pattern can be determined. This is done easily enough since the shrinkage of the rubber compound on hand will not vary and consequently matrix measurements can be predetermined with a fair degree of accuracy once a trial matrix has been made. However, successive batches of rubber must be held to fixed quantities both as to rubber and solvent, a proportion carefully noted when the very first matrix is made in order to prevent shrinkage variation. Also, and for the same purpose, every subsequent matrix must be subjected to the identical vulcanizing process as the first one, that is in regard to time, heat and pressure.

Since reclaimed rubber taken from different shipments cannot be relied upon to produce identical results, a run of trial matrices should be made from a single batch in order to avoid confusion of data.

In the case of the 3-in. ring a trial matrix can be made from one of the try castings already made to ascertain metal shrinkage. Owing to the size and simplicity of the design of this ring wax may be run into the matrix without applying pressure.

The Wax Pattern

Theoretically, the shrinkage of a "dry" wax, i.e., a wax of low viscosity such as carnauba or white bees wax is 1 pct. More details on waxes will be given next week. But since the viscosity of these waxes is not a constant and it is this viscosity which causes shrinkages, the surest and simplest way to determine this factor is also by trial. Consequently, before pouring wax into the trial matrix, make a plaster cast in it and check this cast against the following waxen one. Use a parting compound in making the plaster casts.

The plaster used for this purpose would naturally have to be either one of known expansion or one which is stable and virtually neither expands nor contracts. Kastical, a product of United States Gypsum Co., is such a plaster, manipulation of which will be gone into when discussing the making of master matrices of a low-fusing-point alloy.

In checking wax patterns for dimensions, measure them after a brief immersion in water at room temperature and use thin strips of metal of known thickness between the spindle and the anvil of the micrometer.

Reviewing the steps: Where try patterns are available, as in the case of the 3-in. ring, take any of the trial castings made to ascertain metal shrinkages, and from this make a trial

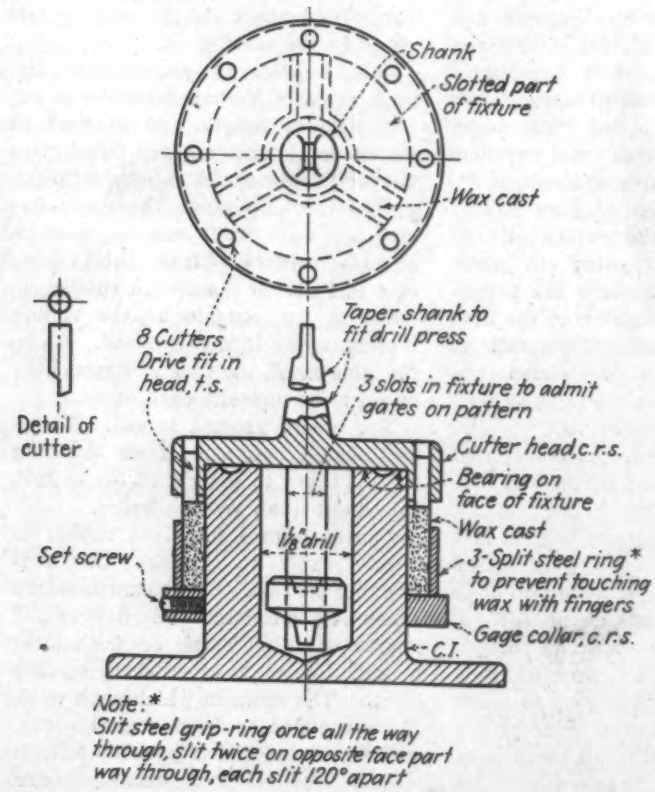


FIG. 21—Design of trimming fixture for removing bosses or traces left by gates.

matrix. From that matrix obtain a plaster cast, then a wax cast, and check one against the other to determine (1) relation of the matrix to the specifications of the metal casting, and (2) the shrinkage of the wax pattern.

When the values of these two final factors have been established the master pattern is made in accordance with the measurements of the plaster cast obtained from the last trial matrix made which, by virtue of the correctness of its measurements, has become the master matrix. (The reason for not depending on measurements obtained from wax patterns, thus eliminating plaster casts, is that wax is easily put out of kilter in handling.) After a mantle has been made for the master matrix, production can get under way.

Matrix Mantle

In general the mantle resembles that of the glue mold, with certain differences. In the matrix the pattern lies with its gates down—see fig. 20. Wax is poured into the matrix through an annular depression in the cover of its mantle. In this depression are six holes which act as gates while a seventh serves as an air vent. When the wax has set the cover is lifted off, thus drawing the rubber matrix with its wax cast out of the mantle. A thin blade of sharp steel is inserted between cover and the face of the rubber matrix, shearing off the wax gates. The matrix is thus split between the metal-pouring gates at the opposite face and is slit up to and including the central hub with its ¼-in. projection. The matrix is then opened here and the wax cast removed.

On the cast will be found six little bosses, the traces left by the wax-pouring gates. These must be removed without disturbing the accuracy. A trimming fixture such as shown in fig. 21 may be employed to accomplish this.

In making comparative casts of plaster and wax for checking purposes, proceed in a like manner.

The plaster to be used for making that mantle and its cover is Kastical which because of its stability will not interfere with the accuracy of the matrix; besides, since it is a hard and durable material it will, with reasonable usage, give long service.

The melting point of either carnauba or white bees wax runs well around 165° F, and either should be melted in a water bath held at a fairly constant temperature. Additional data on waxes and their manipulation will be given next week.

Low-Fuse-Point Alloys

Where the wax infusion is to be under pressure, a rubber matrix, as already pointed out, will not do. The matrix may be cast in either one of several alloys which can be secured under trade names of Kirksite, Cerrobend, Wood's metal and the like. For personal preferences they may be compounded on the premises out of bismuth, lead, tin, cadmium and antimony in varying proportions. Tables for such low-fusing alloys (90° to 352° F) are to be found in most handbooks on machine shop practice. But these compositions are all more or less logy and not one of them is really sharp. Besides, there is always the inevitable shrinkage factor to contend with. Do not cast a matrix in straight lead. Unalloyed lead is to logy a metal to deliver satisfactory results; moreover, it is too soft.

Since sharpness and a minimum of shrinkage is imperative in getting true and accurate impressions, ordinary type-metal (50 Pb, 10 Sn, 30 Sb) obtainable in scrap form from almost any printing establishment is perhaps the most satisfactory material to use for casting matrices because of its free-flowing characteristics. It remains sharp and stands up well under prolonged usage with pressure and has, above all, the decidedly desirable peculiarity of slightly expanding on cooling. The only disadvantage is its relatively high melting point, namely, 600° F. Nevertheless, with a mold prepared from Kastical, well vented, thoroughly dehydrated and fairly warm at time of pouring an excellent master matrix may be cast.

The life of such a matrix may be greatly prolonged by plating it with chromium. The coating should not exceed 0.0005 in. to avoid chipping and unnecessary disturbance of dimensions.

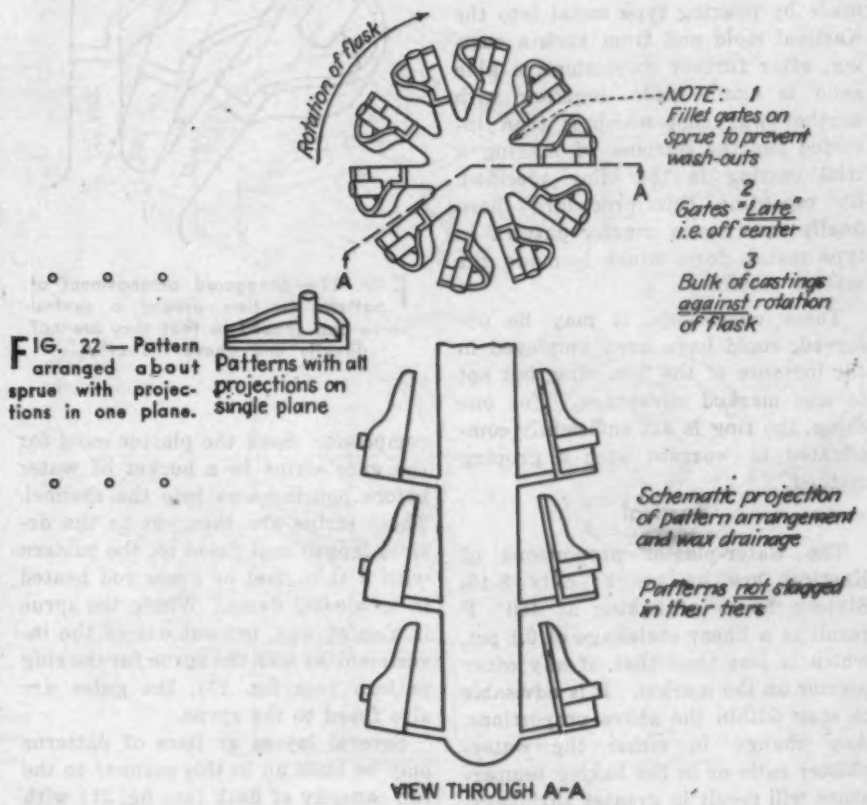


FIG. 22 — Pattern arranged about sprue with projections in one plane.

A rough master pattern may be constructed at the very outset by piecing together its component parts by means of soldering, sweating, pinning, etc., taking into account metal and wax shrinkages. From this pattern a glue mold is made and from this in turn, is obtained a wax cast. In making a wax cast from a glue mold great care must be taken not to have the wax hot so that it melts the glue. Just prior to pouring chill the glue mold with an air blast. After the wax has been heated until it has become thoroughly fluid, allow it to cool until a faint skin forms on the surface. Then pour quickly into the mold and as quickly pour it out again. Again cool the mold with air blast.

Pour the wax in again, and once more empty the mold. Repeat the process three or four times until enough wall thickness has been built up inside the mold to permit removal of the pattern which, incidentally, will be hollow.

This process is to be used when castings are such that no large gates can be tolerated. Hollow wax casts permit the wax to be absorbed by the mold, without having to run out.

The wax replica of the rough pattern produced in this fashion is, after whatever corrections may be necessary, invested in straight Kastical, suitable gates and a sprue provided, and the wax is either run or baked out. A trial master pattern is then made by pouring type metal into the Kastical mold and from such a casting, after further corrections, a glue mold is again made, together with another wax cast which is then invested for the purpose of making a trial casting in the alloy specified. By repeating this procedure there finally emerges a master pattern in type metal, from which is made the master matrix.

These operations, it may be observed, could have been employed in the instance of the 3-in. ring, but not to any marked advantage. For one thing, the ring is not sufficiently complicated to warrant such a groping method.

Kastical

The water-plaster proportions of Kastical are by weight only 8-10. Sixteen hours of baking at 450° F result in a linear shrinkage of 0.1 pct, which is less than that of any other plaster on the market. It is advisable to stay within the above proportions. Any change in either the water-plaster ratio or in the baking temperature will result in greater shrinkage. For the rest, follow directions given previously in Part III in regard to the handling of plaster and for additional information in reference to Kastical see United States Gypsum Co.

The baking time of molds made from Kastical depends upon the size and the general mass of the mold and also upon the shape of the mold cavity; no specific time per in. of cross-section can be given. For unlike an asbestos or a silex-leavened mold, one composed of Kastical is a solid homogeneous mass from which water has to be driven in slow stages and entirely in accordance with its inner and outer structures. The simplest and most reliable way to ascertain complete dehydration is to hold a mirror over the sprue for a few seconds. Generally speaking, heating at 450° F overnight should do unless the molds are large or have exceptionally large cross-sections.

When wax patterns are arranged in a circle and are to be fed through a central sprue, the gates are affixed to the pattern separately. The wax gates are made in exactly the same manner as were made the plaster gates discussed in Part III with this difference, namely, that water is used as a separator instead of a parting

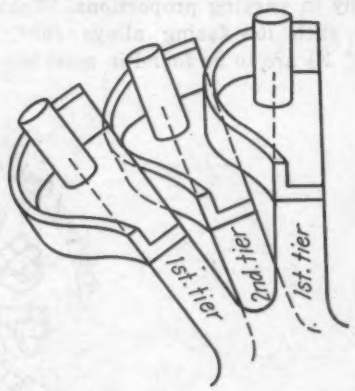


FIG. 23 — Staggered arrangement of patterns in tiers around a central sprue and spaced so that they are not directly one above the other.

compound. Soak the plaster mold for the gate strips in a bucket of water before pouring wax into the channel. These strips are then cut to the desired length and fused on the pattern with a thin steel or brass rod heated in an alcohol flame. Where the sprue is also of wax, not cut out of the investment as was the sprue for the ring pattern (see fig. 17), the gates are also fused to the sprue.

Several layers or tiers of patterns may be built up in this manner to the full capacity of flask (see fig. 21) with these precautions, (1) both patterns and gates are inclined toward the central sprue so that the wax can run out without any trace of it remaining in depressions, and (2) enough care is taken when pouring the investment to insure an absence of air pockets in this now somewhat complicated pattern aggregate. A slow pouring of the investment under constant vibration will take care of the latter. The vibrations should not be so strong as to cause breakage or distortion of the pattern aggregate.

Pattern Arrangement

In regard to the prevention of molten wax remaining in pattern depressions, the problem may not be quite so simple. And since this objectionable feature directly affects production it should be accorded careful study. For, obviously, the more patterns can be crowded into the flask the greater will be the number of castings produced at one pouring. Yet, if crowding threatens prompt wax drainage fewer patterns will have to be used. This holds particularly where patterns have projections on more than one plane. (The pattern shown in fig. 22 has its projections all on one plane.) Patterns with either single or multiple-plane projections must be so arranged that all their angles and curves and projections lie in line with the drainage of the gates so that no pools of wax can form on the way to discharge through the sprue. Such pools, no matter how small, tend to "rot" the mold at that spot under baking heat and these soft spots may mean lost castings. To attempt to burn out these wax remains by raising the baking temperature beyond 750° F is bad practice, since this excessive heat weakens the entire mold and also, to some degree, distorts it.

A temperature of 750° F is the limit that the plaster can stand and still retain some of its bonding properties. Concealed venting and a judicious arrangement of patterns, alternate or staggered in the aggregates, go a long way toward avoiding excessive baking heats when such heats are applied for the purpose of opening the mold's structure for "breathing." When patterns are of sufficient size, cradles can be used for low baking temperatures and thus insure greater accuracy and a better finish. As a matter of fact the secret of the entire baking process is low heat and long time.

As to alternate or staggered patterns, whenever possible patterns arranged in tiers around a central sprue should be so spaced that they are not directly above one another. The gating should resemble the spokes of wheels where the spokes of the upper bisect the angles of the lower one. See fig. 23. Such an arrangement makes for a saving in fuel and baking time since there is then a more even distribution of the mass of the mold and of its pattern cavities.

When patterns are of such shape that no satisfactory wax drainage is possible in any one position, special small-diameter wax drainage vents must be provided and the flasks will have to be upended during their draining time so that the wax can run out either way. Prior to their baking time these channels may be plugged up again with investment. The drawback here is that there will be risers on the casting which must be obliterated in the finishing opera-

tions. The drainage vents, or channels, may be quite small, 1/16 in. or thereabouts. Further points connected with this phase of precision founding will be discussed next week.

Ventings

In metal matrices subjected to pressure, air has to escape through vents and although these may be quite small they must nevertheless be large enough to allow a cleaning wire to be passed through them occasionally. The traces that these vents leave on the wax pattern will of course have to be trimmed off before investment.

Such a trimming operation naturally puts the pattern's accuracy in jeopardy. It would also be necessary in instances where the gates are designed for the flow of metal under centrifugal force are too small or too long to permit a ready flow of wax no matter under what pressure. The difference between wax and molten metal is, in this respect, that the former chills more quickly and thus prevents a complete filling of the mold, whereas metal under centrifugal force will both flow through small gates and rise in the mold cavity as long as it retains any flowing-heat at all. In other words, wax grows logy after losing but a few degrees of heat while metal can lose several hundred degrees heat and still flow. Hence, where such gates designed for metal flow are small in cross-section and long, and because of this cannot shoot the wax quickly into the matrix, special gates for wax alone will have to be added to the pattern and located where cross-sections of pattern are thickest. In such instances separate drainage may also have to be provided. Furthermore, above the thick cross-sections of the pattern there ought to be risers to prevent shrinkage, in much the same fashion that risers are put above heavy cross-sections in sand molds. Since all of these protuberances, gates, vent pins, risers are to be cut off with great nicety and precision, it follows that an appreciable increase in the cost of production can be expected. In arriving at a price of so much per casting all of the following factors will have to be considered: Arrangement of patterns in their flask, the gating for metal flowage and whether these gates are to be integral with the pattern or fused to it afterwards; position of patterns in the flask in relation to wax drainage; their alternate positions in regard to baking time; upending of flask for wax drainage, the placing and removal of extra wax-gates, risers, traces left by vents, by fins and so forth.

Still, with thought taken before setting out, particularly in regard to pattern production—which, it will be noted, is a mass production proposition in itself—despite this catalog of difficulties precision founding usually yields quite satisfactory returns. For once these problems have been solved and the bugs peculiar to all forms of mass production have been combed out, this type of founding, by means of which pieces can be made not possible to produce by any other known means, resolves itself into an out-and-out mechanical process. In many cases it eliminates machining entirely; in all cases does it deliver a better metal. Via either the centrifugal or the vacuum method a house-fly may be cast, complete, wings, legs and all—the only thing lacking being the hair on its body; or, to take the opposite extreme, the gunbarrel of a battleship.

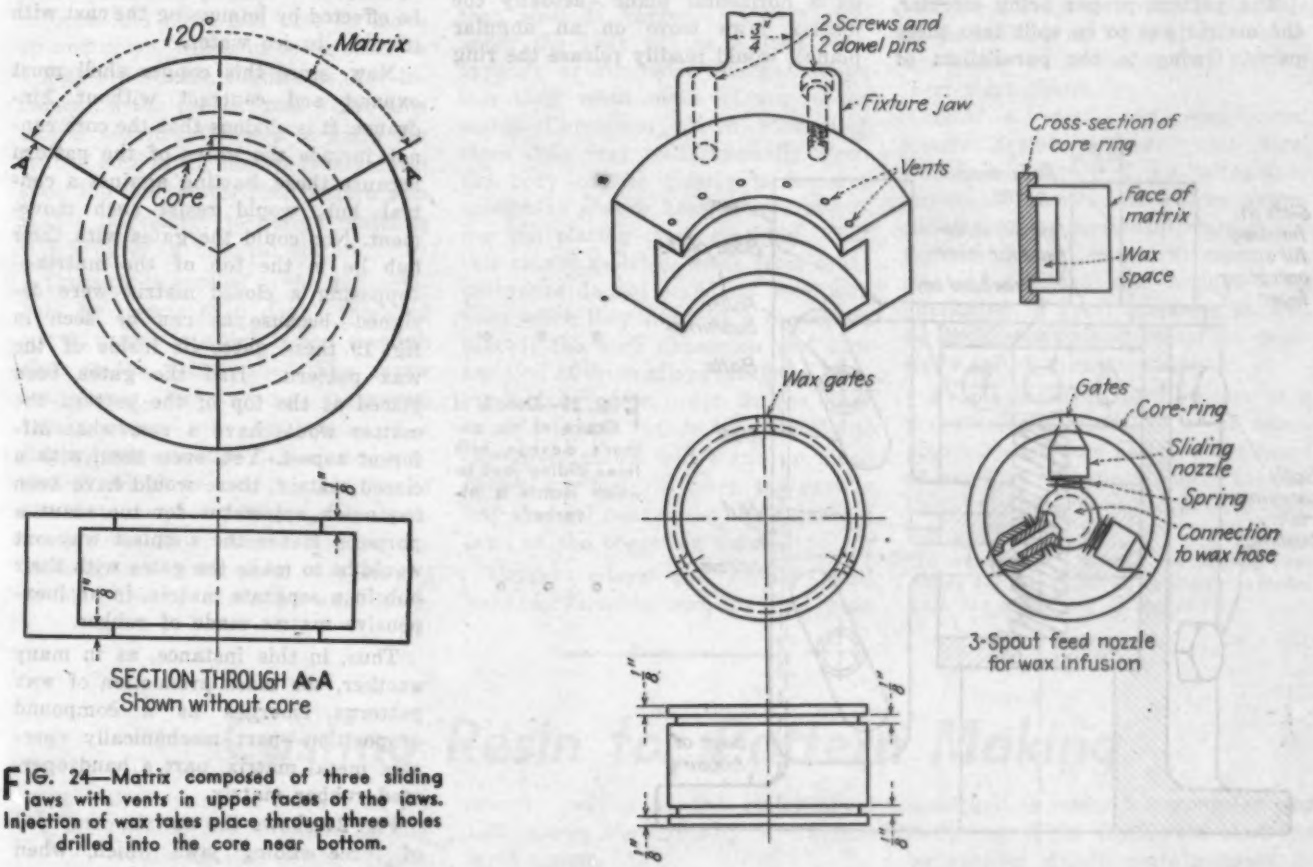


FIG. 24—Matrix composed of three sliding jaws with vents in upper faces of the jaws. Injection of wax takes place through three holes drilled into the core near bottom.

Split Metal Matrices

Since the province of this work hardly includes that of tool design and, further, because the varieties of mechanically operated matrices are as manifold as are the casting propositions themselves, the encroachment

into the field of tool-design will, of necessity, have to be limited to a single example. That example may as well be the 37-in. ring since that proposition, from a split metal matrix point of view, will shed appreciable light upon such matrix making in general.

Considering fig. 19 it will be seen that the pattern consists of three major parts—the ring itself, its three gates and the central hub, to which has now been added the short, tapered, ¼-in. long projection which is to serve as both a wax drain and as a gage-point in the investment flask.

The pattern proper being circular, the matrix has to be split into three parts. Owing to the parallelism of this ring's inner and outer peripheries—a somewhat awkward feature because there is no draft—it would not be possible to get a single matrix to function. There will have to be two matrices for this apparently simple ring, one for the ring itself and another for the gates, the latter to be fused to the wax ring in a separate operation.

The reason for this is that the ring must have a core of some sort to produce its inner periphery. That core, a metal one and rigid, will be in the neighborhood of 2½ in. in diam. Then there is the outer shell, or mold, which has an inside diameter of 3 in. or whatever the trial castings have shown to be the correct dimensions. In between the inner diameter of the mold and the outer one of the core, wax is to be poured or forced in under pressure. This wax, upon cooling, shrinks about 1 pct, as already mentioned. The wax ring being about 0.250 in. in cross-section, it can be assumed that the diametral shrinkage of the ring will be around 0.006 in. This would mean that the wax ring, after cooling, would be so tight around its metal core that it could not be gotten off again.

There would be no trouble about the outer shell of the matrix since its three parts, moving simultaneously on a horizontal plane (actually the matrix jaws move on an angular plane), would readily release the ring even if it hadn't shrunk away from the inner walls of the matrix. The difficulty lies with the core which despite its size cannot in this case be easily collapsed without the use of a complicated and expensive mechanism. The core would have to retain its perfectly circular shape. Besides, such a collapsible core would naturally entail fins being left on the inner periphery of the ring, which fins are awkward and time-robbing to remove before investment. For this reason the core will have to be made in a single piece.

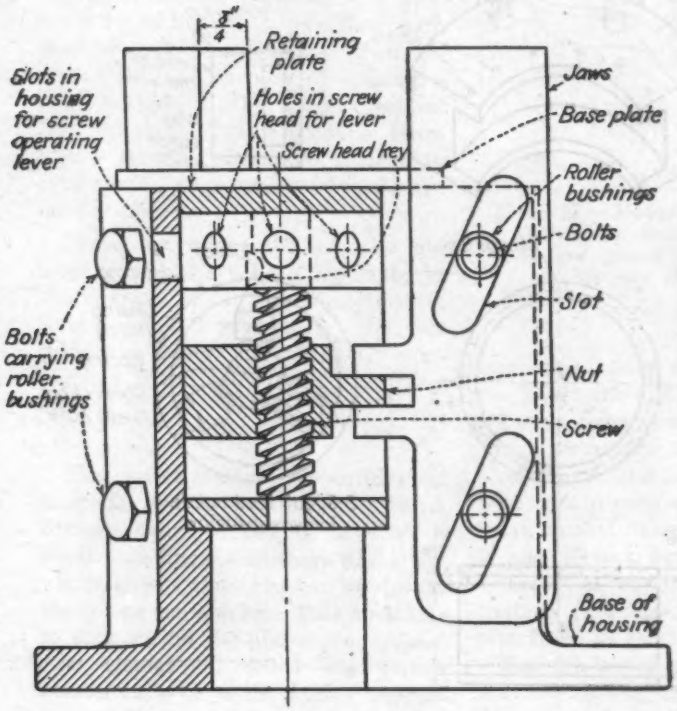


FIG. 25—Details of fixture of the author's design with three sliding jaws to which matrix is attached.

Copper Core

But even if this core were in a single piece and were removable from the matrix, the difficulty would not be solved since the soft wax ring couldn't be stripped off under pressure—as, for instance, by means of an arbor press. Hence the only way out is to make a core of some metal which will have the correct diameter at room temperature. It is one which will expand slightly and almost instantaneously on coming in contact with the hot wax and which, after removal from the warm matrix with its operating fixture, will again shrink to its original diameter. Copper suggests itself at once and thus the core is to be made from a piece of copper tubing. The shrinkage necessary for the release of the wax pattern can easily be effected by immersing the cast with its core in ice water.

Now, since this copper shell must expand and contract without hindrance, it is obvious that the core cannot include the gates of the pattern because these, butting against a central hub, would resist such movement. Nor could the gates with their hub lie in the top of the matrix—supposing a closed matrix were designed—because as can be seen in fig. 19 these gates lie inside of the wax pattern. Had the gates been placed at the top of the pattern the matter would have a somewhat different aspect. Yet, even then, with a closed matrix, there would have been too much apparatus for too scant a purpose. Hence the simplest way out would be to make the gates with their hub in a separate matrix, in an inexpensive matrix made of rubber.

Thus, in this instance, as in many another, the mass production of wax patterns emerges as a compound proposition—part mechanically operated metal matrix, part a hand operated rubber matrix.

Fig. 24 shows the matrix composed of three sliding jaws which, when closed, locate centrally the copper core. Vents are provided in the upper faces of the jaws to allow air to escape and the injection of the wax takes place through three holes drilled into the core near its bottom. A feed nozzle with three sliding spouts supplies the wax. When the matrix is filled, as evidenced by the vents, the matrix jaws are opened and the core with its wax ring around it is lifted out of the fixture operating the jaws, then immersed in water to chill. When removing the wax ring from the core some wax is usually left in the feed gates of the core and this is removed by simply twisting a drill into the gates, thus cutting away the obstruction. Likely enough, this operation will leave three spots on the inner periphery of the ring, but this will not matter since the gates in-

tended for the metal pouring are fused on the pattern at these locations.

That the fixture shown in fig. 25 has but three jaws to which the jaws of the matrix are attached is of no moment since this fixture may be designed with as many sliding jaws as is practicable. The design consists of an outer cast-iron shell slotted to receive, in the present instance, three flat members which have cut into them two slots each at an angle, in this case, of 25°. Rollers held in the shell cause these flat members, when subjected to lateral pressure, not merely to open and close but also to move up and down, which in some cases is a highly desirable feature as, for instance, in the present one where this lateral movement serves to press the central core of the matrix firmly down upon the base plate. This feature also makes it possible to design matrices which have no integral bottom.

Pressure is applied to the flat members by means of a double-threaded screw, access to which is had through slots in the fixture shell. The screw transforms its turning movement into a lateral one by means of a flanged nut engaged in a slotted projection which is an integral part of the flat members. While only moderate pressure is needed to move the jaws and so cause them to open and to close or to move up and down, very great pressure would be required either to spread the jaws or to close them when they are in position. In other words, even when using a wax pressure as high as 1200 psi, the matrix attached to the fixture jaws would retain its shape.

As to the kind of metal that is best adapted to the making of matrices, that would depend to some extent upon the size of the casting to be made and its design. In general it may be said that a matrix made of tool steel lasts longer than one made from cold-rolled stock, even when the tool steel is not hardened. Yet, when that steel is hardened, the matrix, under the heat of the molten wax, expands or otherwise changes shape less then when made of any other metal. Chromium plated cold-rolled stock does very well especially when the body of the matrix is massive enough to absorb heat, thus preventing the plating from cracking. For this reason matrices made from brass or bronze do not stand up very well even when they have been chromium plated; the high expansion and contraction of these alloys crack the plating in fairly short order. On the other hand, a matrix cast in type metal and chromium plated will stand up much better, particularly when the matrix has a sound bearing on the actuating jaws of the operating fixture.

Copper alloys and copper itself have a valuable and, as has been shown in the example just now discussed, an indispensable application. For instance, in the case of the above core, this expands on contact with the hot wax and thus the wax ring inner diameter is enlarged for the time being. This enlargement is to some degree maintained in the cooling process so that the wax ring never in actuality shrinks the theoretical 0.006 in. It cannot shrink to its theoretical limit because wax shrinks slower than does the copper and by immersing both core and wax ring in water a very thin film of water forms between the two, chilling the inner periphery of the wax ring. Incidentally, an addition of 1 pct of Aerosol to the water would cause that film to form much faster.

Since a small and complicated matrix from hardened tool steel would be difficult if not altogether impossible to make, it will be appreciated that its successful making and performance is dependent upon the size and design of the castings to be duplicated in great numbers as well as upon selection of materials especially suited to matrix making.

As the toolroom is the heart of a manufacturing plant, so is the mass-production of wax patterns the heart of precision founding, hence, exhaustive study must be accorded each casting problem.

[In next week's article the author continues his discussion of matrices together with the modelling of waxes.]

Casting Resin for Pattern Making

WOOD patterns have been duplicated at approximately one-eighth the cost of the original with a Durez liquid phenolic casting resin, according to the experience of Metal & Alloy Specialties Co., Inc., 1879 Elmwood Avenue, Buffalo. These resins were first used as a material for making forming dies faster and more economically for the very light metals used in the aircraft industry. Such items as stretch press dies, jigs, assembly and holding fixtures, masking shields for painting and plating, have all subsequently been cast from resin. (See accompanying photo.)

An advantage of the plastic material in pattern making is the fact that once it has been properly cured it does not swell or shrink as a result of exposure to moisture or changes in atmospheric conditions. Shellacking or reconditioning is unnecessary, because the resin itself is highly resistant to moisture as well as wear. The low specific gravity of the resin, about 1.25, makes the handling of the patterns simple.

A mold is made from the original pattern from plaster, or casting resin for that matter, and the liquid casting resin is poured into it. The part is allowed to set at room temperature for about 4 hr and is then baked in an oven at 140° F for about 8 hr. The pattern is then removed from the mold and is ready for mounting and daily use. This duplication time can be speeded up in certain cases by shortening the curing cycle. The resin will not hold heat or be softened by it. It can be worked with ordinary wood-working tools, although this is seldom necessary, for the liquid resin follows the contours of the mold exactly and holds those contours to predetermined tolerances.

THE original wood pattern (right) has been duplicated with a casting resin (left) at a small fraction of the cost of the wood pattern. A mold is made from the original pattern in plaster and the liquid casting resin is poured into it.

Repair of Defective Gray-Iron Castings

By S. H. BRAMS
Detroit Editor, THE IRON AGE

THE desires of Army Ordnance for a recommended and standandardized shop procedure for the repair of defective gray-iron castings intended for automotive use have led to the development of a recommended procedure prepared by the War Engineering Board of the Society of Automotive Engineers in cooperation with Ordnance representatives. This has been embodied in Ordnance Engineering bulletin No. 152 and its revisions, purposes of which have been defined as the facilitating of production by satisfactory quality repair practices, the indication of unsatisfactory practices and their explanation, and the development of improvement in casting quality by frank discussion of existing defects and means for repairing them. Of course beyond that the bulletin is intended to avoid misunderstandings as to quality levels between foundries, fabricators and the armed service procurement agencies.

Four procedures are outlined, one covering gas and arc welding, a second involving nickel welding (so-called "cold welding"), the third being general nickel welding and the fourth covering special repair conditions. Of these gas and arc welding probably find the widest use.

Whenever any flaw is found it must first be opened up to determine the extent of the defect, and to judge whether or not it is repairable. Once it has been decided that the defect can be satisfactorily welded, it and its adjacent areas must be thoroughly cleaned, preferably by flame gouging after preheating, to show by the change in color and flash of the flame that the defective areas are completely removed. Unless the operator is highly skilled and able to tell when the defect is burned out by the flames ceasing to flash, it is recommended that a generally accepted inspection method, such as kerosene, or mineral spirits in chalk, black light and fluorescent oil inspection, acid etching, magnetic particle inspection or some other be employed to be sure the area is completely removed. Chipping tends to hide the defect, and so if this method is used great care must be exercised. Sand or grit blasting may be used for mild cleaning, but cannot be depended on for dirty or burnt-in areas. In some cases involving cracks, small holes are drilled beyond the ends of each crack, and the metal is then ground out from drilled hole to drilled hole.

Preheating should be done slowly and uniformly. In the case of plain iron it should be raised to a level between 900° and 1100° F before welding; for high-strength iron, the range will be 1050° to 1250° F. Preheat temperature should not exceed 50° below the critical temperature of the metal, determined by analysis of the castings. Casting and furnace should start cold together, and in any case not over 350° F when the fire comes on, although in batch furnace practice heavy castings may be charged in a furnace when the pyrometer shows 600° to 800° F. Of course it should be realized that thin sections or delicate castings may crack with sudden heat application, and great care should be taken in any case to insure that castings are heated so as not to cause too great stresses by thermal shock.

Welding should begin as soon as the work is removed from the furnace. Speed is essential to quality, because the temperature of the casting should not be allowed to drop below 700° F during welding, and certain castings may require an even higher minimum; under some circumstances it may be desirable to apply auxiliary heat during welding.

The rod or electrode should preferably be of gray iron or of such nature that the weld has structure and hardness comparable to the parent metal. For arc welding and some torch welding, flux-coated cast-iron electrodes are used. Weld deposit in any case should be uniformly sound metal and readily machinable. In the case of gas welding a suitable flux must be used, providing adequate flotation, fluidity, or puddling, so the wells are sound and free of slag or gas inclusions.

Castings should be stress relieved after welding at a level of 1000° to 1100° F for plain iron. The temperature range for high-strength iron should be determined by its analysis; post-heating temperature should not exceed 50° F below the critical temperature of the iron. Cooling must follow very slowly thereafter. In a continuous furnace the casting should be cooled to 700° F maximum before removal, but preferably should be carried much lower. If no furnace cooling provisions are available, the castings should be buried in powdered silocel, asbestos, etc., for heat insulation to insure slow cooling.

Cold Welding

In so-called cold welding, pieces are considered unrepairable if after cleaning the defect is greater than 3/16 in. in diam in the ring travel or 5/16 in. in diam outside the ring travel, or if it extends through more than one half the machined thickness of the well involved.

Welding is done on the cold piece, no preheating being recommended. An electrode of 94 pct nickel bare wire of not greater than 5/32 in. diam is used.

The welding transformer should provide from 6 to 12 v, comparatively

low, along with high heat around 350 amp, so the nickel is melted and scratched off the wire while plastic. No continuous arc should be held, as this would result in a hard heat affected zone. Necessarily the operator should be very experienced.

No post-heating is necessary with this process. After the weld has been completed it should be smoothed off with a small grinding wheel, and the bore rehoned.

For general nickel welding, a standard arc welding machine is employed, using as low amperage as is consistent with sound deposits. Every effort should be made to hold down the heat in the casting to a minimum. Generally this method is employed to furnish sound deposits to repair small defects in non-critical areas of machined castings, and is used where subsequent machining or tapping is necessary. Also falling in this category is the intermittent welding process, performed by utilization of high amperage and resulting in an intermittent arc, thus lessening the tendency toward excessive heat accumulation and consequent hard heat affected areas. The flaw must be cleaned out to determine the extent of the defect, but the size is not quite so limited as in the cold welding field.

After thorough cleaning by chipping, grinding or machining, welding is carried on without preheating or postheating. After completion the welds should be dressed with a small grinding wheel, or subsequently machined.

The specification permits gas welding with local preheat and postheat on semifinish castings under special conditions. When this operation is done correctly heat affected zones are not critical, but welding of this type should be used only when there is no danger of affecting important areas of the castings. It should be done only by expert welders and then only on corners, curved areas, or other places where expansion and contraction are not restricted.

Flaws are opened up as in ordinary gas and arc-welded areas, and after similar preparation preheating is done by the gas welding torch to dull red heat, approximately 1000° F. Welding procedure is the same as for ordinary gas and arc welding, and a similar rod and flux are used. Postheating is carried out by the playing of the flame by the operator on the area around the repair in a gradually diminishing manner over a period of several minutes, thus providing slow cooling through the critical range. Here, again, only the most expert welders should be permitted to do the work, and every precaution should be taken to insure uniformly good results. Samples should be cut and checked for hardness and microstructure before allowing this type of repair, and the hardness and microstructure of the repair itself should approximate that of the parent cast-

Repair by Brazing

Repair work by means of brazing with gas torch heat utilizes approximately the same procedure except for the filler material used. A Tobin brass rod is generally used for the deposited metal, the bulletin declares, producing a stronger and harder deposit than the nickel repair previously described. This method can be used for minor defects in such locations as bearing seat covers, locating pads, etc. A special cast iron brazing flux should be used.

Individual cases requiring special treatment may utilize hard silver solder and other similar materials. In these cases the procedure should be worked out and approved for the particular casting involved.

Soldering is permissible for the repair of gasket faces or other small machine surfaces showing defects where structural strength or high temperature is not involved. The proper type of solder is specified, such as 97.6 pct zinc and the balance copper, with melting point approximately 700° F. Strong uncut hydrochloric acid should be used for soldering flux, and a soldering copper at dull red heat is preferable for applying the solder. This solder, it should be noted, is harder than ordinary tin-lead solder and melts at much higher temperature. After repairs, the work is finished by filing, machining or grinding.

Plugs or bushings are permissible to repair leaky areas subject to compressive stresses or low tensile stresses. These plugs should be of gray cast iron of approximately the same hardness as the parent metal, and should be taper threaded and employed so as to have at least three threads engagement when finished. They should be inserted after coating both male and female members with a litharge-glycerin sealer. Bolt boss bushings should be so designed as to transmit bolt compressive loads on shoulders adequate in size to carry loads without creeping. Bushings should be so fitted as to be leak tight to pressure test after assembly and sealing.

Peening repairs, under this specification, are limited to weepers or seepers. They should not be attempted for leakers. Round-nosed, hemispherical and semicylindrical peening tools and power hammers should be used.

Polymerized resin sealers for leakers beyond the category of weepers or seepers may be used where the test water under pressure comes through in a fine misty spray and not in a solid stream. A pressure of at least 50 psi should be applied to force the sealer into the leaks, after which the sealer is drained and the casting baked at sufficient temperature and time to thoroughly polymerize the sealer. Only sealers may be used which after polymerization resist action of water, alcohol antifreeze, glycerin antifreeze, ethylene-glycol antifreeze, cooling system corrosion inhibitor, gasoline, lubricating oil, trichlorethylene, Stoddard solvent, kerosene, or other antifreezes, corrosion inhibitors, or cooling system cleaners approved by the procuring services.

For rusting repairs, the use of sal-ammoniac on seepers or weepers should be done by dissolving approximately 10 pct sal-ammoniac in the pressure area test water and forcing the sal-ammoniac-water solution into the porous areas under pressure from 65 to 100 psi. Sal-ammoniac should never be used by being placed on in castings in high concentration without pressure. Sal-ammoniac should not be permitted for leakers beyond the category of seepers or weepers where liquid comes through under test pressure at the rate of not over two drops per sec.

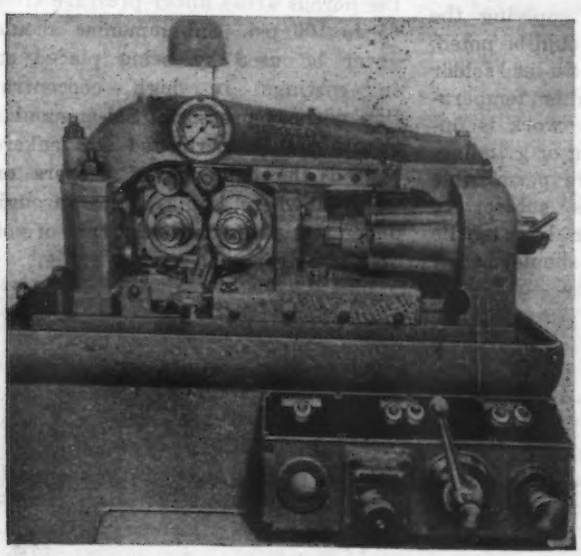
▼ ▼ ▼

New Equipment

Machine Tools

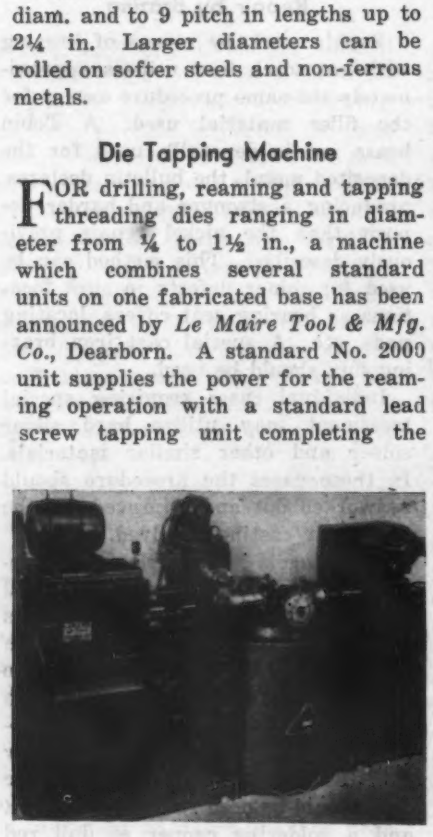
. . . Recent developments in tapping, milling, grinding and thread rolling machines are described in the following pages.

A CENTERLESS thread generator using the principle of the centerless grinder has been announced by *Steinle Machine Co.*, 63 Allyn St., Hartford. This thread roller carries the workpiece on the work rest so that its center line is slightly below the centers of the two circular forming rolls. One roll revolves about a stationary axis while the sizing roll, mounted on a heavy dovetail slide, is hydraulically fed to a predetermined point, automatically released by the electric tripping device and returned to its starting position allowing the piece to be removed. There is no axial movement of the workpiece during the generating cycle, the blank merely revolving in contact with the threaded rolls. Rigidity is assured by a top tie bracket casting which has a hardened steel plate against which a roller on the front end of the roll assembly contacts, thereby preventing the slide from being lifted because of work forces. In addition, the slide itself is guided at both top and bottom. With circular rolls, the work piece may make as many revolutions as necessary to finish the thread, since the rate of infeed is governed by the resistance of the work against deformation under uniform hydraulic pressure. Accuracy may be held for Class 4 fits. The machine will roll threads in heat treated material from ⅛ to 1 3/16 in. diam. and to 9 pitch in lengths up to 2¼ in. Larger diameters can be rolled on softer steels and non-ferrous metals.



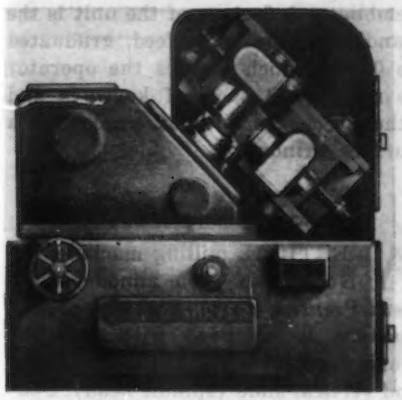
Die Tapping Machine

FOR drilling, reaming and tapping threading dies ranging in diameter from ¼ to 1½ in., a machine which combines several standard units on one fabricated base has been announced by *Le Maire Tool & Mfg. Co.*, Dearborn. A standard No. 2000 unit supplies the power for the reaming operation with a standard lead screw tapping unit completing the cycle. Master collet and inserts make possible the accommodation of many size dies, and change-over from one size die to another is very simple since speeds are infinitely controlled by hand knob, and feeds by flow valve. The cycle of operation is load, drill, ream and tap. Production on an average size die of ¾ in. is about 83 pieces an hour.



Double Spindle Milling Machines

A LINE of double spindle milling machines for light production work requiring medium duty cuts in metals and plastics has been announced by *W. H. Nichols & Sons*, 46 Woerd Avenue, Waltham, Mass. The machine illustrated has two opposed spindles with No. 40 milling machine taper. Adjustments are provided so that the spindles can be lined up or can be set out of line 2½ in. vertically, 2½ in. horizontally and in or out 1½ in. Another model, not shown, can be supplied with two identical spindles, one directly over the other. A vertical adjustment is provided so that the center line of the spindles can be positioned from 4½ in. minimum to 7½ in. maximum. Both models have a choice of spindle drives. They are supplied with two motors, one for each spindle so that independent selection of spindle rotation is obtained. An optional drive uses a single motor which runs both spindles in the same direction.

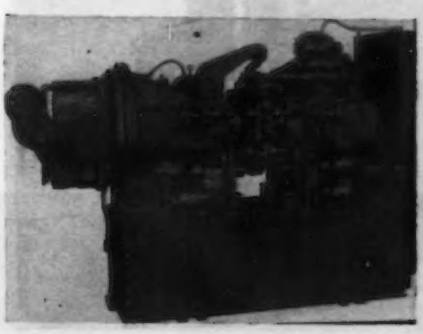


Shaving Machine

A ROTO shaving machine designed primarily for finishing the back face and bore of automotive rear axle ring gears has been announced by *National Broach and Machine Co.*, 5600 St. Jean Avenue, Detroit 13. The machine can be used to finish pressure plates, internal ring gears and other parts. Cutter heads can be made for a variety of special applications. Roto shaving is a rapid, close tolerance green finishing operation for circular, flanged, cylindrical and conical parts. The complete cutting cycle on large truck ring gears both back face and bore is approximately 15 to 20 sec. The machine will handle ring gear bores from 4¼ to 9 in. having an outside diameter up to 15⅝ in.

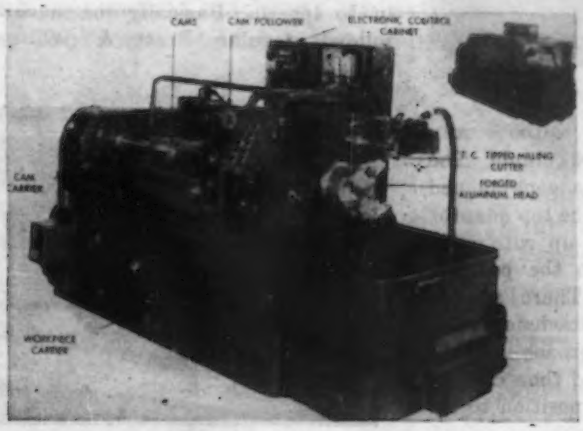
Automatic Cycle Machine

A TWO-WAY automatic cycle machine for performing 12 processing operations on a brass sprinkler head body has been announced by *Snyder Tool & Engineering Co.*, 3400 East Lafayette Avenue, Detroit 7. The work-piece is held in a fixture which is a double jaw, right and left hand screw chuck. This chuck assembly is actuated in the loading station by hydraulic cylinders. Six of these fixtures are mounted on a trunnion which is indexed 60° station to station. Each sprinkler on the individual station has a separate slide and spindle motor and each spindle has separate hydraulic control. The hydraulic power for the operation of the tool slides and clamping and unclamping cylinder comes from a hydraulic power unit set behind the machine. The index mechanism with large diameter locating plate is mounted near one end of the machine and the fixture trunnion is keyed to that mechanism through a heavy trunnion shaft.



Fin Milling Machine

A MACHINE with combined electronic and hydraulic control for milling the circular, partial and dome fins on a forged aluminum airplane cylinder has been developed by *Sundstrand Machine Tool Co.*, Rockford, Ill. Milling of the circular and partial fins is done in one operation. The milling of the dome fins requires a change in the cam, the cutter and the work holding fixture. The rate of feed varies automatically within a range of 6 to 60 in. per min. with the actual rate depending upon the depth of cut and horsepower consumed. Operation is completely automatic after loading. The cutter can be set to rapid approach to within ⅛ in. of each fin.



Tool Grinder

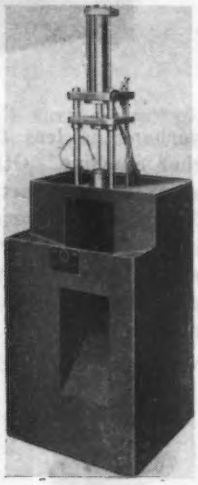
FOR cylindrical, internal, taper surface, tool sharpening and form tool grinding, a 12 x 28 in. universal and tool grinder has been announced by *Landis Tool Co.*, Waynesboro, Pa. Headstock design features include variable voltage and combination live and dead panels. It is unnecessary to change belts or guards when changing from live to dead spindle and work speeds are controlled by a dial on the front of the machine. Headstock construction is such that face plate overhang is less than that of any other machine. Other design advantages include starting and stopping of work and traverse by single lever, either of which may be operated independently of the other. Also this lever automatically disengages the hand traverse when the table is operated by power. The footstock is fully protected from water and grit. The swivel table has a large inverted-V to insure correct alinement of headstock, footstock and various fixtures. The table can be swiveled 180° on a hardened and ground taper pin.

Boring and Facing Machine

FOR simultaneously boring and facing the banjo housing on a variety of automotive truck and tractor axle housings, an automatic machine has been developed by *Cross Co.*, Detroit. It bores and faces the bowl flanges and the inner lugs on front and rear axle housings. The work is located in the fixture with a

power-operated gaging mechanism for automatically dividing the stock prior to power clamping. This new feature eliminates the old practice of manual location as well as surface plate layout and subsequent gaging to layout lines. The full automatic operating cycle is controlled from a centralized push button station.

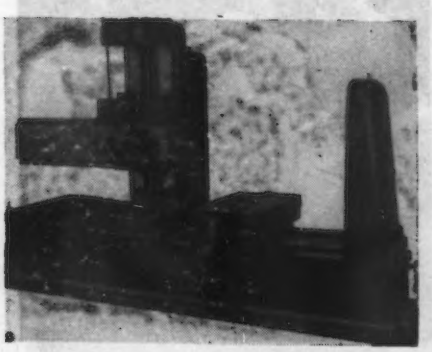
Broaching Machine



A VERTICAL broaching machine developed especially for small parts has been announced by *Zagar Tool, Inc.*, 23880 Lakeland Blvd., Cleveland 17. The machine is built with three guide bars, similar to a three post die shoe so that the broach is said to be pushed straight without any deflection in the machine column. The broach is pushed with a cone shaped cup which is located in the top adaptor plate and which mates up with a 45 deg angle ground onto the pushing head of the broach. There are no broach holders or attachments to fasten the broach. The broach is pushed through the work and then carried back up to its original position to repeat the cycle.

Milling and Drilling Machine

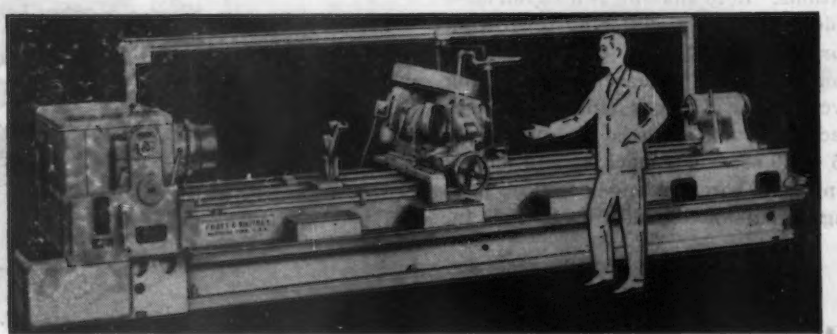
A 2½ in. horizontal boring, milling, drilling and tapping machine, Model No. 22, has been announced by *Defiance Machine Works Inc.*, Defiance, Ohio. Infinitely variable high speeds from 25 to 1600 rpm are obtainable giving a complete range of speeds in one spindle. It has a direct reading indicator for spindle speeds and direct reading chart. Spindle



and sleeve bushings are nitralloy. The machine has 18 feeds in geometrical progression, ranging from 0.002 to 0.125 per revolution of spindle. Five feeds are standard tapping leads. Accessories include precision thread cutting attachment for English or metric threads, coolant equipment, dial indicators and end measure for head table movements and verniers for head and table movements.

Large Thread Miller

A LARGE size thread miller has been announced by *Pratt & Whitney, Division Niles-Bement-Pond Co.*, West Hartford, capable of handling work up to the equivalent of a standard 2½ in. circular pitch worm thread. Maximum work diameter is 12 in. with a swing of 19 in. over the carriage and 27 in. over the bed. It is available in bed lengths with center to center distances varying from 30 in. to 168 in. Basically the machine follows regular Pratt & Whitney



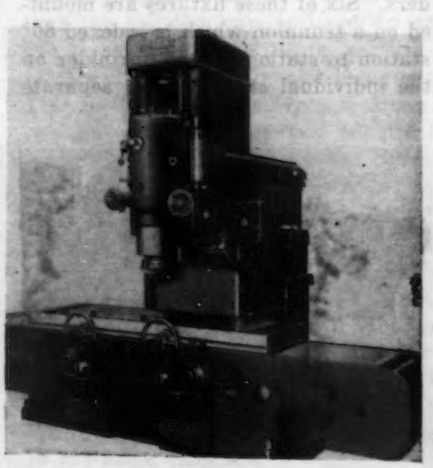
thread miller design, but features many improvements, including climb milling. Collet capacity is 6 in., and leads may be cut from 12 per in. to 36 in. with standard gearing, and left hand leads from 12 per in. to 48 in. An indexing device is incorporated into the head and permits the production of 2, 3, 4, 6, 8, 12 and 24 starts. Two cutter spindles are furnished, each mounted in its own block for easy changeover. The larger is for large, heavy work ranging up to 1⅝ in. depth of cut, and the smaller for work up to 11/16 in. depth of cut. A device for picking up the lead of threads already cut is included.

Broach Sharpener

A FLAT broach sharpener and back-off machine has been announced by *Great Lakes Broach and Gage Co.*, Detroit. The machine will handle practically all flat broaches, insets, keyways and broach bar assemblies. A feature of the unit is the handle for the table feed, graduated to 0.0005 which enables the operator to restep and back off keyways and other broaches without employing a surface grinder.

Vertical Milling Machine

A VERTICAL milling machine, the No. 4, has been announced by *Reed-Prentice Corp.*, Worcester. The machine is equipped with an electronic feed drive for table, cross-slide and vertical slide (spindle head). Features of the machine include a centralized push button control station and centralized operating levers. The feed rate can be set by adjusting the potentiometer's knobs. The table, cross-slide and vertical slide (spindle head) are driven by three 1½ hp, dc motors with electronic control to provide infinitely variable feed rates. The range of the drives is from less than ½ in. to over 25 in. per min. There are two electronic units for the control of the three motors, one unit for the table motor and the other one for the cross-slide and vertical slide (spindle head) motors. Shift of the latter unit from one motor to the other is accomplished by means of a selector switch mounted on the push button control station.



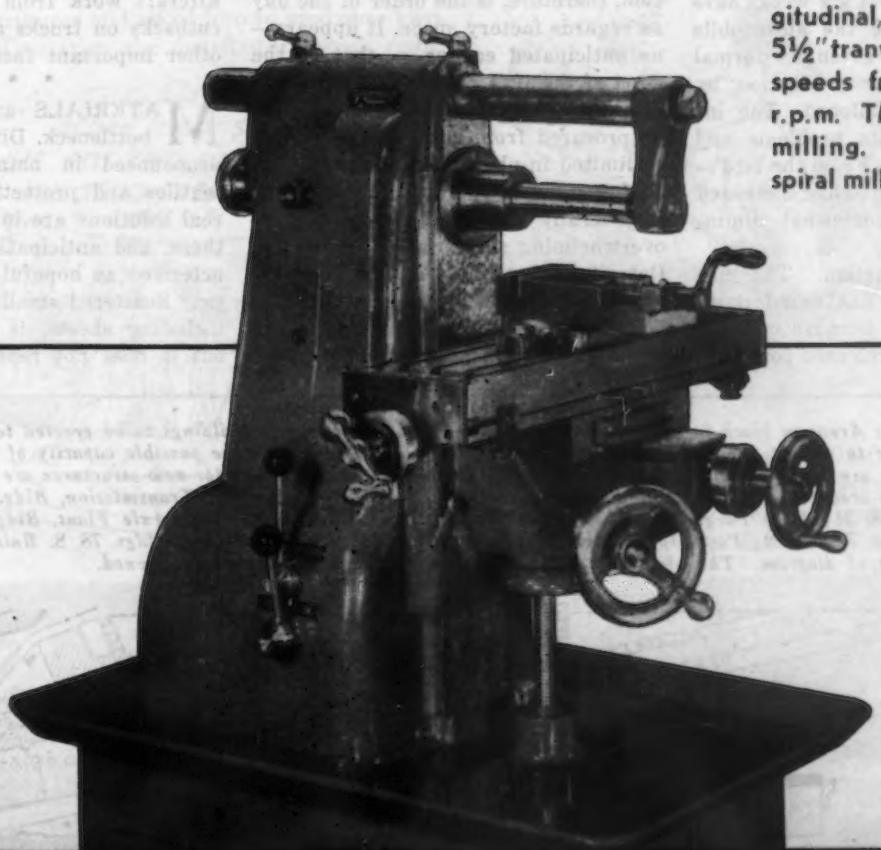
HARDINGE
ELMIRA, N.Y.

HARDINGE High Speed Precision Milling Machines meet the needs of your tool room and laboratory

Precision tool room milling is profitable on this milling machine, designed to meet a definite need in the tool room and laboratory. The precision construction, along modern lines, combines ruggedness with extreme accuracy for ease of operation. Investment and time cost will indicate that larger milling machines are extremely expensive and awkward for many tool room and laboratory milling operations.

SPECIFICATIONS

1" collet capacity, 14" longitudinal, 13¼" vertical, 5½" tranverse travel, eight speeds from 110 to 1850 r.p.m. TM model for plain milling. UM model for spiral milling.



"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

Assembly Line . . . .

STANLEY H. BRAMS

• An air of pessimism hovers above Detroit, where six weeks since July 1 have seen little progress made toward solving the shortages of materials . . . Volume auto production unlikely before fourth quarter.

DETROIT—About six weeks have gone by since the automobile industry was given its formal go-ahead on new car production by the War Production Board. The industry now knows its problems and prospects rather well. From the bird's-eye view, the problems have increased and the prospects somewhat diminished.

First, as to production. The machine tool situation has eased quite considerably, largely because of military cutbacks which released considerable time in the supplier plants. Similarly, the makers of tooling for these machines and of general factory equipment are able to keep pace with the machine tool availability. There does not appear to be any problem, therefore, in obtaining the means for production in the limited quantity necessary for initial output runs, and the indication is that the larger requirements later will be available for volume manufacturing as needed.

Construction requirements are not in such a good situation. The jurisdictional strike of the AFL Building Trades Council and the CIO maintenance workers held up authorized building for a few weeks. Actual releases have been slow to come through from WPB for other plants, additions and revamped facilities which have gone past the drawing board stage and, in some cases, have been awarded for building on bidding. Improvisation, therefore, is the order of the day as regards factory space. It appears—as anticipated earlier — that at the start of the 1946 model runs a greater proportion than ordinary of parts will be procured from outside sources due to limited in-plant facilities.

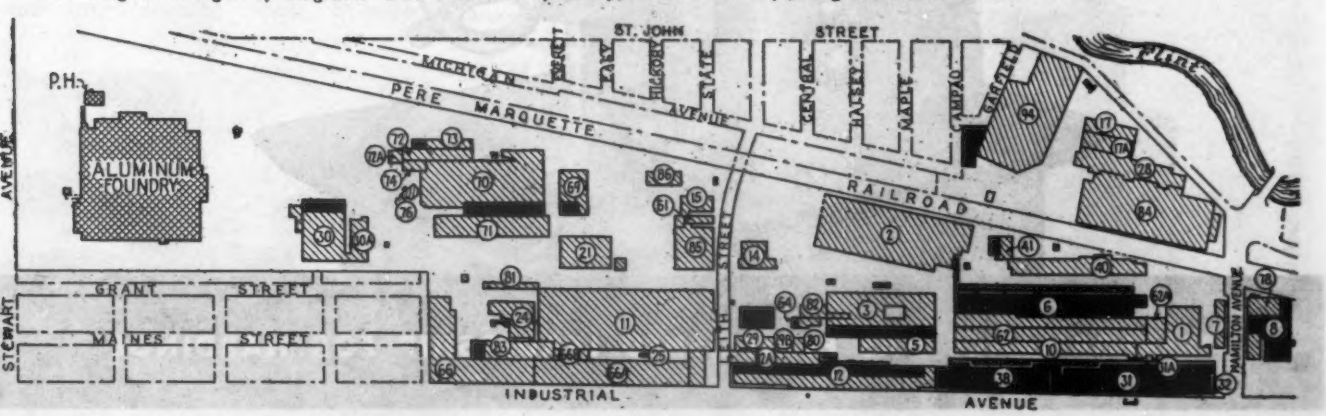
Manpower to operate the equipment is generally available, but there is no overwhelming supply of it. Although Detroit employment has dwindled perhaps 25 pct since the city reached its peak last winter, the number of available men is not nearly in that proportion. Labor in Detroit as on the West Coast, seems to evaporate about as fast as it is released from payrolls. As earlier, the requirements continue to range from common labor up to the highest skill jobs; there is no surplus at any level. One reason for this may be the slow diminishment of women workers, many of whom are dropping off factory payrolls, going back to their homes, and vanishing from the labor market.

War contracts are still a reconversion problem in many plants, but on the whole they are imposing no obstacle of major dimensions. Detroit's war contracts have been cut back about 15 pct in dollar volume. They will be reduced further in the months ahead, and sharply. Indications point to the rate of Detroit's war production falling by the end of this year to a bare quarter or so of what it was last winter due to withdrawal of most aircraft work from the area, to big cutbacks on trucks and tanks, and to other important factors.

* * *

MATERIALS are today's prime bottleneck. Difficulties are most pronounced in obtaining steel, tin, textiles and protective coatings. No real solutions are in sight for any of these, and anticipations can be characterized as hopeful but not optimistic. Scattered small tonnage in steel, including sheets, is coming through, but it does not represent production

BUICK EXPANSION: *Areas in black in this map of the Buick Flint properties are buildings to be erected to provide* 1,325,000 *sq ft of new space to permit expansion of production by* 40 *pct in postwar to make possible capacity of more than* 550,000 *cars. Shaded areas are present buildings. Buildings to be demolished to make way for new structures are outlined in white. Postwar production area centers are as follows: Car assembly, Bldgs.* 6, 62, 10, 1, 2; *Transmission, Bldg.* 40; *Sheet Metal Plant, Bldgs.* 12, 38, 31; *Drop Forge, Bldgs.* 3, 5, 30; *Motor Plant, Bldgs.* 11, 24, 83; *Axle Plant, Bldgs.* 66, 66*A*; *Gray Iron Foundry, Bldg.* 70, 71, 69; *Past Model Parts Machining, Bldgs.* 84, 28, *Engineering, Bldgs.* 78, 8. *Buick main offices are in Bldg.* 7 *at right of diagram. The aluminum foundry, at extreme left, is government owned.*



"GREENFIELD MAN" SHOWS HOW TO ELIMINATE THREADING BOTTLE-NECK WITH "ACORN" DIE

(A GTD SHOW-HOW REPORT)

1 A "Greenfield Man" on a routine service call at a large plant in New York State was told by the Tool Supervisor that they had to finish threading a certain part by hand because the threading operation on the turret lathe was producing tapered threads. "It is a major headache," said he.

2 "That looks like a 'natural' for one of our 'Acorn' Dies," said the "Greenfield Man". He located an "Acorn" Die Releasing Type Holder in another department which he adapted to fit turret of machine by having shank ground down from ¾" to ⅝".

3 While shank of holder was being adapted to fit turret, the "Greenfield Man" phoned local "Greenfield" Distributor and asked him to send over two "Acorn" Dies from the distributor's stock right away.

4 Before the "Greenfield Man" left the plant, this emergency "Acorn" Die set up was running smoothly producing perfect threads, and an order was placed for the correct size holder

Results!

A needless operation was eliminated. Production time was cut to a fraction and a serious bottle-neck eliminated. Value of on the-spot show-how service by "Greenfield Man" and quick delivery from stocking "Greenfield" Distributor was demonstrated.

Greenfield's SHOW-HOW is KNOW-HOW in action!

ON THREADING PROBLEMS SIMPLY CALL YOUR "GREENFIELD MAN" THROUGH YOUR "GREENFIELD" DISTRIBUTOR!

quantity. Nor is it likely to unless cancellations expected by WPB materialize shortly.

Tin may be had where necessary to coat pistons and to produce bearings, but its use is prohibited in body solder. Actually, of course, body soldering tin is more a filler than a joining medium, but tin is the only material which seems to bond, and its prohibition for uses other than on moving parts can well impose a serious handicap on the car makers unless experiments being worked out by some of them progress to successful conclusion.

Textiles have been found here and there in quantity enough to get cars started off the lines, but after initial runs there will be no more on hand unless the picture changes materially by then. The shortage of phthalic anhydride, most important diabasic acid used in alkyd enamels and lacquers, would indicate that coatings used for body finishes will lack some of their quality of prewar years.

When production problems resolve themselves there remains one key merchandising riddle on which no decision has yet come out of Washington —price. The Office of Price Administration has made a number of moves toward establishing a price structure on the 1946 models, but has not arrived at a platform. Two of its specialists have made the rounds of the automobile companies to talk over the situation and now are writing a report.

Anticipations as to what will be embodied in their recommendations are varied. Some feel that they will come out for a very small price increase and that a rather leisurely determination will be made. Others believe they were impressed by the points made by smaller manufacturers that they had to have substantially higher price levels than in the prewar days. From within OPA itself comes a kernel of belief that speedy action is necessary to sidestep any possibility that OPA might be blamed for delays in automobile deliveries. And there also remains the choice of deciding whether to set up an industrywide price formula—a fixed proportion of increase for all companies—or to arrange a method of computing increased costs which could be applied individually by each company. Figuring into this problem also is the determination of a price structure for the parts makers, who have been trying unsuccessfully to obtain one for many months and who have had little luck at it thus far.

* * *

IN this respect OPA's action in setting the Willys civilian jeep price at $1,090 f.o.b. Toledo is not looked upon in Detroit as a signpost outlining the level of passenger car prices, inasmuch as the vehicle represents a new class. This price, incidentally, seems to cover about ten pct or so more than the delivered price of the jeep to the Army, plus the dealer's profit margin.

Those are the problems. In their light, there seems to be little prospect of production of any consequence until the fourth quarter. Ford is continuing to build cars and likely will be able to do so at modest rates until new supplies of materials come to the Rouge. Willys can follow a parallel course. General Motors divisions, however, are checkmated at present by lack of materials. Chrysler plants are writhing around in attempts to reconvert the internal policy of looking askance at anything interfering with war production. Packard is stymied for materials. Nash, Hudson and Studebaker are in somewhat similar straits.

So today's mood in Detroit is not entirely happy. But, as always, situations can change overnight in autodom. A cancellation that would free some body sheets for Detroit, a government edict alloting some textiles, or any other step which would be interpreted as a move to break the materials logjam could change the front office frowns to beatitudinous joy in a twinkling.

RANGE FINDER: *Combining the features of an ordinary speedometer with those of a tachometer and adding instructions governing various engine speeds, this "Economy Range Finder" is being offered by the White Motor Co.*

This picture shows position of pointer on dial of the White Economy Range Finder when truck is approaching hill at rapid rate of speed.

As speed decreases in climbing hill, pointer drops until lower edge touches 6th gear line at outer end, calling for shifting into 4th gear.

Speed is reduced to crack anewals hill and pointer drops to indicate 3rd gear line, telling driver to shift into 3rd. Gear climbing is avoided.

Truck maintains speed as it climbs hill in 3rd gear. White keep on pointer being over 3rd gear line indicates proper engine speed.

Gaining speed as truck crawls over top of hill, lower edge of pointer reaches outer end of 3rd gear line. This indicates it is time to shift into 4th.

Driver travels in 4th on level ground until he picks up speed. Pointer, touching outer end of 4th gear line, indicates shift into 5th.

Cutbacks Reduce G.M. Backlog at Quarter

New York

• • • Cutbacks of war contracts have reduced the backlog of General Motors to approximately $2,520,000,000 as of June 30, as compared with a total of about $3,690,000,000 at Mar. 31, of this year, stockholders were told by A. P. Sloan, Jr., in his report covering the second quarter.

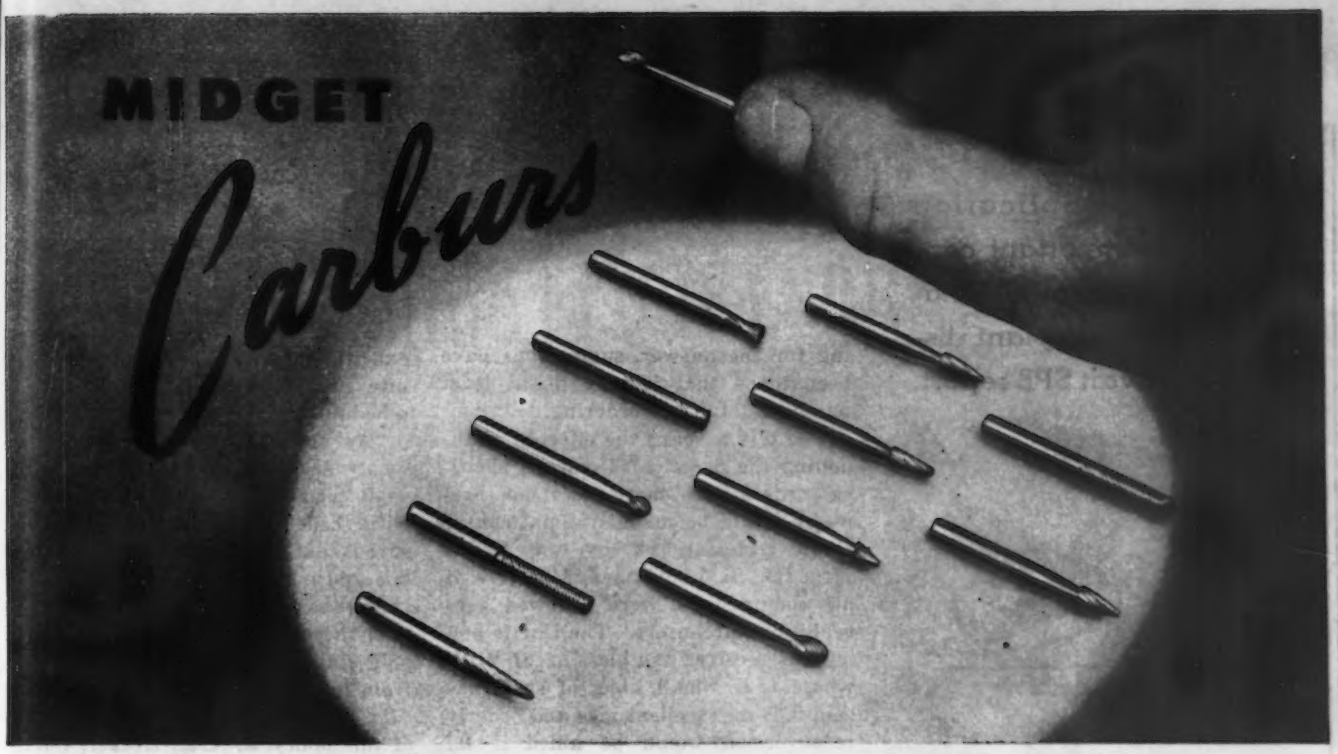
During the second quarter, the report said, an average of 411,385 persons were employed, as compared with 432,489 in the previous quarter and with 475,471 in the second 1944 quarter.

Sloan told stockholders "not to expect immediate production of the new car which is to be manufactured and distributed by Chevrolet."

Premium Authorized On Copper Alloy Scrap

Washington

• • • Sellers of nonferrous scrap metals have been authorized by the OPA to add a special use premium of 1¼c. per lb to base maximum prices for copper alloy scrap when the scrap is prepared to meet the specifications of certain qualified consumers and is sold suitable for their direct use without further preparation. Effective Aug. 6, this is covered by amendment 4 to revised MPR 20.



Industry's First SMALL CEMENTED-CARBIDE ROTARY FILES FOR TOOL ROOM, DIE SHOP AND PRODUCTION DEPT. USE.

Carburs, in extremely small sizes, are now available for application where small, mounted grinding wheels have ordinarily been used.

These new, small cemented-carbide rotary files offer many advantages not provided by grinding wheels. Their life, in many cases, is more than 100 times that of a wheel. Their form does not break down. They will cut faster in any material—including hardened die steel—on which grinding wheels might be used. They can be used in places where a wheel will not go, and are much better for holding sharp corners.

Midget Carburs are of solid cemented-carbide with heads as small as ⅛" diameter. Practically any desired shape can be furnished. As they are produced as special tools, prices are quoted on the basis of specific requirements.

Carburs in larger sizes are available in a wide range of standard shapes and sizes. Write for descriptive booklet.

FOR JOBS LIKE THIS

A prominent gear company formerly used a minimum of eight mounted grinding wheels to burr one ring gear. These gears have a C-63 Rockwell hardness. Today, using midget Carburs, at least eight gears are completely burred with one tool.

In other instances, and especially on die work, these tools have demonstrated a service life much greater than shown in this particular example.

LINCOLN PARK INDUSTRIES, INC.

Successor to The Lincoln Park Tool and Gage Company and Carbur, Inc.

1729 FERRIS AVENUE • LINCOLN PARK 25, MICHIGAN

Washington . . . L. W. MOFFETT

• Order duplication seen as important contributing factor to inflation . . . Steel plant disposals await SPB report.

WASHINGTON — Duplication of orders placed by material-hungry buyers has for a long time raised the question whether there isn't a great deal of inflation in officially published steel and other requirements. The practice of purchasers besieging a market of so-called scarcity with the same order booked on several mills in the hope that one of them can fill it is not new. It was one of the important causes of the inflation of prices in the boom period of 1919-20, followed by the inevitable period of deflation with its low operations, unemployment, depressed prices and red ink.

During the present period of reconversion, production controls are being relaxed and buyers eager to get supplies are rushing into the market. Some supplies are still reported tight because of continuing war needs which have not shrunk nearly to the extent that was expected with VE-Day. There is doubt, however, that all of the squeeze for material is genuine. Carrying on a Pacific war with its vast lines of supplies clearly is an operation of great difficulty and requires enormous tonnages to keep the pipe line filled. Yet this job of crushing the Japs should take much less new material than was needed for a two-front war, particularly in view of the fact that large quantities of equipment are being transferred from Europe to Japan's doorstep.

It is for this reason that the growing jam in demands for many products seems to be anomalous. Searching for the answer, suggestions have been made that it may lie at least partly in duplicate ordering.

The test to learn the effect of abandoning the practice of placing identical orders with more than one producer would be made if a pattern of single ordering set by the Curtis Mfg. Co., St. Louis, manufacturers of air compressors, were followed generally by purchasers. The Curtis policy has received the blessing of WPB whose J. D. Small, chief of staff, has said it is an excellent idea and orderly reconversion would be aided if all manufacturers would follow suit. WPB itself, Mr. Small said, has given thoughtful consideration to the feasibility of prohibiting the placement of any duplicated unrated orders but abandoned the plan primarily because of the manifold difficulties involved in obtaining compliance with such a prohibition.

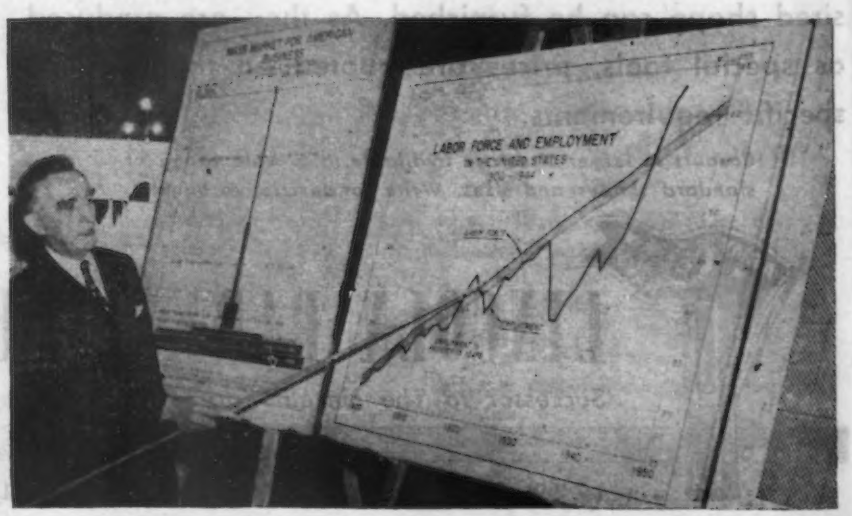
The Curtis Co. has voluntarily adopted a purchasing policy designed to prevent indiscriminate duplication of unrated orders. The company policy covering procurement of raw materials and components was set forth in a letter it has sent to all its sources of supply. Under this policy, the company pointed out, orders show specific delivery information and exact quantities. They represent definite requirements for production schedules.

"As there will be no duplication whatever on our part," the letter said, "you can, in every case, proceed with the execution of our orders, assured that our commitment is bona fide and not subject to withdrawal or cancellation except, for causes entirely beyond our control. This is our policy and there will be no deviation from it."

In informing WPB Chairman Krug of this policy, J. A. A. Hecker, Curtis purchasing agent, enclosed a copy of the letter sent suppliers and said that the company felt that if all purchasers had to certify on all unrated orders, already placed and to be placed, that these orders had not been duplicated elsewhere, it would prevent a fictitious backlog being set up. As it is, Mr. Hecker said, if orders are allowed to be placed indiscriminately with the idea in mind of accepting the first one shipped and cancelling the others, an unhealthy and unsatisfactory condition might be created.

In his letter commending the company on its policy, Mr. Small said that if duplication of orders grows in volume the plan for prohibiting the

FULL EMPLOYMENT: *Postwar jobs for veterans and war workers are the object of the full employment bill. In committee testimony Sen. Joseph O'Mahoney, who has been active in plant disposal hearings was the first witness.*



TOOL-LIFE UP 2½ TIMES...

PRODUCTION INCREASES 43%

SUNICUT...

Steps-Up Output of Aluminum Pieces from 700 to 1,000 Pieces a Day

One of the war-plants was producing important parts for binoculars and range-finders on a Browne & Sharpe Automatic Type 2-G machine. The operation consisted of boring, threading, forming, and knurling #17 ST 1½" aluminum bar-stock at 1,580 R.P.M. spindle-speed.

The cutting oil used at first did not give them the desired tool-life and production.

Then they consulted a Sun Cutting Oil Engineer who carefully surveyed the operating conditions. He recommended a change to Sunicut. Results . . . output jumped from 700 to 1,000 pieces a day . . . an increase of 43%. Formerly they had reground tools every 100 pieces. Now they regrind after every 375 . . . an increase of more than 2½ times in tool-life.

Machine-tools in large and small plants, like this, throughout the country have demonstrated the superior qualities of Sunicut. Sunicut protects tools, improves finishes, steps-up production. For complete data on Sunicut and Sun's other products for metal-working, call the Sun Cutting Oil Engineer in your territory, or write . . .

SUN OIL COMPANY · ***Philadelphia 3, Pa.***

Sponsors of the Sunoco News Voice of the Air — Lowell Thomas

SUNOCO **SUN INDUSTRIAL PRODUCTS**

OILS FOR AMERICAN INDUSTRY

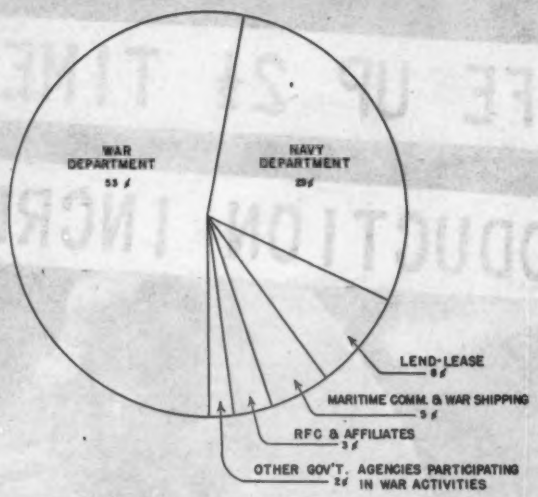
placement of any duplicate unrated orders might have to be officially applied, "to some limited areas which seriously threaten to retard reconversion." Mr. Small added that he was passing Mr. Hecker's suggestion on to the proper officials for their future consideration.

* * *

SALE of the Geneva steel plant to anyone of the companies that have shown interest to date—United States Steel, Henry Kaiser and Colorado Fuel & Iron—is out of the question until the Surplus Property Board makes known its disposal policies in a forthcoming report to Congress, an SPB official has pointed out.

Recent administrative changes within the SPB, notably the appointment of W. Stuart Symington as chairman, together with the current Congressional recess, are expected to delay presentation of the policy report until October.

Under provisions of the law, government-owned plants valued in excess of $5,000,000 each may not be sold outright until appropriate disposal policies are formulated and submitted to the Congress. However, there are alternative provisions which permit leasing of these plants for periods up to five years.



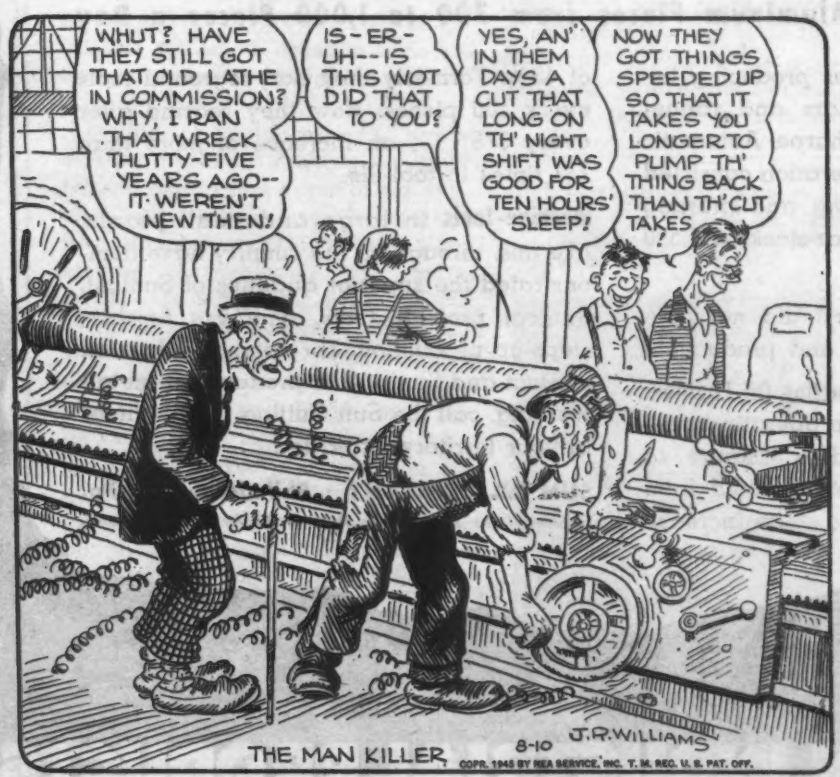
WAR DOLLAR: *Who spends our war dollars is graphically shown in this chart covering the period from July of 1940 to March of 1945.*

A prospective lessee would be obliged to pay reconversion costs which would be prohibitive unless government aid was furnished. A recent estimate of supplementary finishing facility costs at Geneva approximate $73,000,000. There is therefore little prospect of concluding a lease agreement without an option to purchase which can be included only after disposal policies are made known.

In formulating disposal policies, it is said, SPB may determine which groups are eligible to acquire the plants involved but there is no intention of a predetermination to exclude anyone from bidding.

Although no formal bids have been received to date, it is expected that final determination of policies by SPB may depend on an analysis of proposals from the standpoint of (1) financial backing, (2) utilization of the plants and (3) efficiency of the prospective management.

THE BULL OF THE WOODS — BY J. R. WILLIAMS



Machine Tool Surplus Data Itemized in Recent RFC Report

Washington

• • • **More than one-fourth** of the RFC salable surplus property on hand on June 30 consisted of machine tools, metalworking machinery and communication and electronic equipment.

In a recent report, RFC said that of the machine tools the following are the largest volume items: Lathes, $12,259,000; milling machines, $9,211,000; boring machines, $8,479,000; and grinding machines, $7,149,000.

Steel to the value of $18,992,000 was on hand out of total acquisitions of $30,892,000. Sales aggregated $7,418,000, the original price being $1,900. The largest sales were in bars, which were disposed of at $1,648,000 as compared with an original cost of $3,754,000.

MDNA Officers Re-elected

Philadelphia

• • • **Officers of the** Philadelphia chapter of the Machinery Dealers' National Association, organized in December, 1944, have been re-elected. George McClennen is chairman; Frank J. Lunney, vice-chairman, and J. E. Middleton, secretary.

What does it take to make a war?

It takes more than a toothbrush mustache, an upraised arm, a symbol on a flag.

And it takes more than guns and tanks and planes.

It takes ignorance, intolerance and want. . . . The psychopathic mire that breeds little conquerors, and the political softness that makes nations look the other way.

But what does it take to *prevent* a war?

It takes knowledge, communication, and freedom of thought. . . . Economic opportunity, and productive power.

And it takes a strong police force to keep the rough neighbors kids in line and slap the gangsters down.

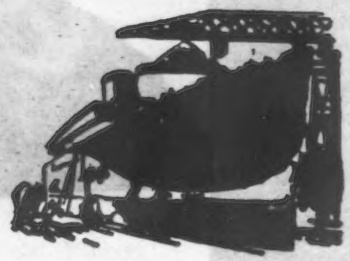
America lacked what it takes to *make* a war. But we have what it takes to win one . . . and to *prevent* one in the future. Today, the engineers of the basic machine tool producers stand ready to help the men of government and of industry in their postwar planning for a strong America — a nation powerful enough to prevent future wars with the strength of a healthy economy here at home, and the best equipped military police force the world has ever seen.

BRYANT CHUCKING GRINDER COMPANY SPRINGFIELD VERMONT, U.S.A.

West Coast . . .

OSGOOD MURDOCK

• Higgins Industries negotiating for southern California and Puget Sound plant sites . . . WPB irks Pacific Northwest by terming Salem clay-aluminum plant unessential.



LOS ANGELES—Andrew J. Higgins of New Orleans and lower Mississippi boatbuilding fame is invading the already competitive southern California industrial market.

Wade E. Miller and Charles E. Dayton, president and general manager, respectively, of Aircraft Tools, Inc., are acting for the Higgins interests in negotiating for a plant site to manufacture small boats.

Name of the new Los Angeles firm is Higgins Pleasure Craft Co. of California. The company intends to seek the materials and let contracts for the erection of the new factory as soon as negotiations for the plant site have been completed.

Size and capacity of the plant itself have not yet been determined, but the well-known Higgins boat building sagacity will be applied to the production of three types of small craft.

The sub-assembly plant will start turning out a 10½ ft plastic-bonded boat, a 26 ft pleasure craft and a 55 ft custom built yacht. Apparently the first known invader of what is expected to be a vastly expanded West Coast pleasure craft market, Higgins intends to apply his war-won knowledge of mass production methods to the new venture and perhaps furnish a new market for some of southern California's worried parts manufacturers. Coast Chris Craft plants and other well-known small craft manufacturers are still busy with Army and Navy contracts.

Other Higgins' plans, still in the tentative stage, are reported to be construction of other plants, including a dry dock, to cost up to $50 million, as well as a Seattle plant with which the company plans to break into the Northwest and Alaskan fishing boat business.

* * *

Sub-division of war plants was recommended to P. P. Eccles, representative of the Senate surplus property sub-committee by a group of Los Angeles industrialists last week. This suggestion, closely resembling the recent feeler put out by the Department of Commerce, carries the recommendation of James F. Bone, manager of the industrial department of the Los Angeles Chamber of Commerce and is indicative of the Southland's concern over aircraft construction termination and the growing problem of what to do with these large plants.

* * *

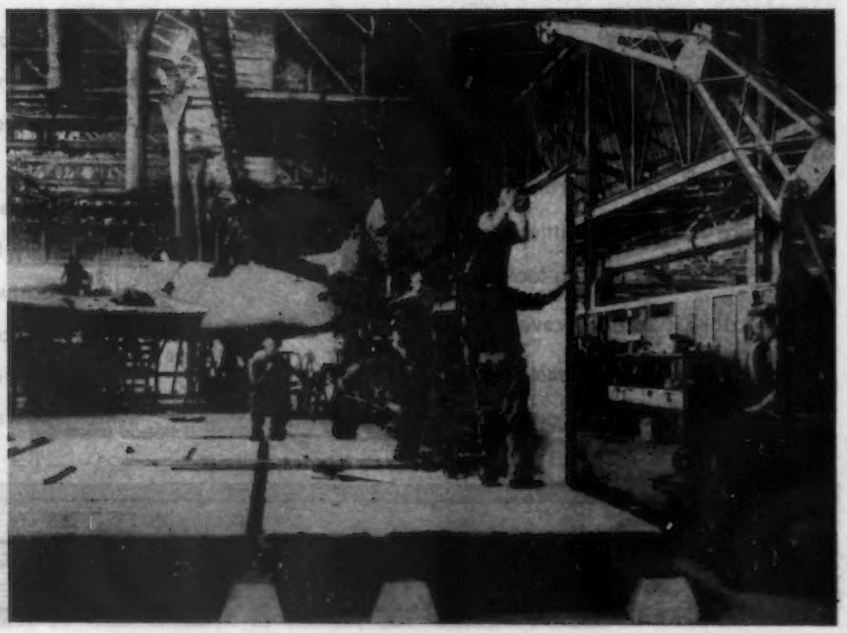
Government's attempt to control employer-union relationships in the airplane industry is about to be abandoned. The CIO announced last week that they were withdrawing from the West Coast Aircraft Committee, following AFL's similar withdrawal three months ago.

The CIO committee said that the restudy system dealing with job evaluation, description and merit wage increases was responsible for 90 pct of union grievances; that the work of the restudy committee consumed time out of all proportion to possible benefits and results achieved; and that the aircraft industry is approaching a virtual "folding-up stage" anyway.

* * *

SALEM, ORE.—Mounting dissatisfaction with WPB control of the Salem alumina plant erupted here last week as Nigel Bell, chairman of the WPB aluminum division, announced in Washington that the plant is not needed to meet war requirements and that he saw no justification for continuing to sponsor it. Bell's statement roused quick agreement from local businessmen who welcomed the suggestion that the

BRITISH RECONVERSION: *A Bristol Beaufighter factory in England, with a war contracts cut back, is now starting production on the aluminum housing project sponsored by the government.*



Tomorrow's JOBS MEAN PLANNING *Today*

Let EX-CELL-O's Complete Parts Manufacturing Facilities Help Keep Your Assembly Lines Rolling

One proved American way to more jobs is efficient production and the increased product demand that comes through lower costs . . . this is why definite planning today to manufacture most efficiently, economically and quickly is a direct step toward sustained business prosperity and a high level of employment. Ex-Cell-O can help you if your plans call for accurately-made metal parts and sub-assemblies on a production basis. Write to Ex-Cell-O, Detroit 6, today.

Don't gamble with your future product . . . plan to use XLO PARTS

One of the numerous inspection departments in Ex-Cell-O Miscellaneous Production Parts Division

EX-CELL-O CORPORATION
DETROIT 6, MICHIGAN

45—70

XLO
EX-CELL-O for PRECISION

EX-CELL-O's *facilities:*

PRODUCTION ENGINEERING

The Ex-Cell-O organization, with skill, facilities and modern methods that have made a wartime record, can make an important contribution in the planning of quantity production of quality parts and unit assemblies for your postwar product.

HEAT TREAT

Induction Heating
Laboratory for Heat Treat Control Including Micro Examination and Photography
Atmosphere Control Continuous Hardening Furnaces
Atmosphere Control Box Hardening Furnaces
Various Types of Air-Draw Batch Type Furnaces
Gas Carburize Furnaces
Box Carburize Furnaces
Pack Anneal Furnaces
Nitriding Furnaces
Cyanide, Lead, and Neutral Salt Pot Furnaces
High Speed Steel Atmosphere Control
Vertical and Horizontal Hardening Furnaces
Continuous Air-Draw Furnaces
Sub-Zero Heat Treating Equipment

PRODUCTION MACHINES

Multiple Vertical Turret Lathes
Multiple Spindle Automatic Screw Machines
Single Spindle Automatic Screw Machines
Hand Screw Machines
Centerless Grinders
Single and Multiple Spindle Drilling Equipment
Plain O.D. Grinders
Plain I.D. Grinders
Milling Machines
Broaching Machines
Precision Thread Grinders
Precision Boring Machines
Lapping Machines
Special High Production Equipment

UNIT ASSEMBLIES

For many years Ex-Cell-O has supplied large and small manufacturers with parts and has also supplied many parts in unit assemblies after machining, heat treating and grinding.

INSPECTION

Ex-Cell-O has always maintained that quality in a product is not the result of accident; that quality is built into a product by rigid adherence to accepted quality standards . . . standards that are upheld at Ex-Cell-O by efficient inspection at every step of the machining process.

WPB relinquish its interest and claimed that the Board opposed the project. WPB continued to hinder it even after construction had started, is was charged. Ammonium sulphate required for the 50 ton scheduled daily capacity of the plant is needed for the fertilizer industry, according to the War Food Administration. Northwest businessmen feel that the $4 million investment represented by the nearly completed plant and the employment which would result from private operation of the plant rank equally important with the food program. Total government investment in the Northwest aluminum industry amounts to $153 million dollars and, in the opinion of these men cannot be passed over lightly. Far from waiting for or wanting the government to accept final responsibility for continued operation of the aluminum plants, private and local industries have already signified their willingness to take over parts of their operation. The Columbia Metals syndicate has under consideration a plan to purchase a government-owned alumina plant in the far Southeast, dismantle it and move it to Troutdale, Ore., on the Columbia River.

* * *

SEATTLE—Construction of four new Columbia River dams to cost $280 million depends on the outcome of the vote of owners of 1,000,000 acres in the Columbia basin being held this week.

Largest of the dams, according to H. A. Parker, Bureau of Reclamation irrigation engineer, will be the Potholes Dam in central Washington. This dam is to be three and one-half times the length of the 4173 ft Grand Coulee job. The other three dams, one at South Coulee, one at North Coulee, and the other at Long Lake, will be 9880, 1650 and 1360 ft long, respectively.

* * *

SAN FRANCISCO—Freight traffic figures in the San Francisco-Oakland area moved to new highs for June. Railroad switching figures amounted to more than 76,000 cars, 13.5 pct above last June and within one-half of one pct of the May all-time high, and the worst may yet come.

Sunday loading was halted last month to enable the yards to move their empties east. Recent reports have indicated that one line had 4000 cars backed up as far east as Salt Lake City. Street talk such as this is poohpoohed by traffic officials, partly because some freight information now is "restricted" by the Army, which commands the Port of Embarkation, and perhaps also to allay possibility of shipper panic.

Known, however, is the fact that there have already been temporary embargoes on loading of several days duration in the interior agricultural regions. Officials continue to characterize the situation as one of "occasionally recurrent over the past few years." While recent reports indicate that the yards now are cleared, anyone evaluating the situation is bound to compare the admission of past unreported freight jams with the mounting load required to man and supply the Pacific war. The question naturally rises, "If this condition existed before the present congestion, what will be the result of present increasing movement?"

Tightest spot in the freight car picture is the shortage of reefers which simply are not coming back west. A movement is afoot to encourage eastern shippers to use reefers for westbound shipments just to get them back here.

Implications of the crop loss possibility, and its later effect on the tinplate business has been eased somewhat by an FTC recommended amendment to the ICC orders on refrigerated cars which may relieve the situation.

Unofficial Washington sources reported last week that freight movement has reached its peak, but that Pacific bound troop trains would step up from 60 trains a day to 140. As this is no mean figure in itself, the issue is still not entirely clear. Shippers are inclined to remember that all the best laid plans and logistics may still add up to snafu.

* * *

Machine tool men on the Pacific Coast are pricking up their ears at mention of a move to try and free some warplant tools for commercial use.

Like most commodities these days, machine tools are also somewhat dependent on the dictates of the military—whether Army or Navy. As has been observed before, these bodies are prone to go to some lengths to be sure they are never caught short. This policy, in the case of machine tools, has tended to protect the military at the possible expense of western reconversion.

A move may start to try and persuade the military to release some of these for reconversion—or, as it has also been put, resumption. The way the plan would work is to simply permit the firms which now have the tools to dispose of them if they have no immediate and pressing need for them.

· **TRANSPORT HELICOPTER:** ***Built under the direction of Frank Piasecki, president of the P-V Engineering Forum, this Navy Helicopter is thought to be the largest in use today. It is designed as a special air-sea rescue plane, and for transport tasks.***

WPB Classes Plants Surplus

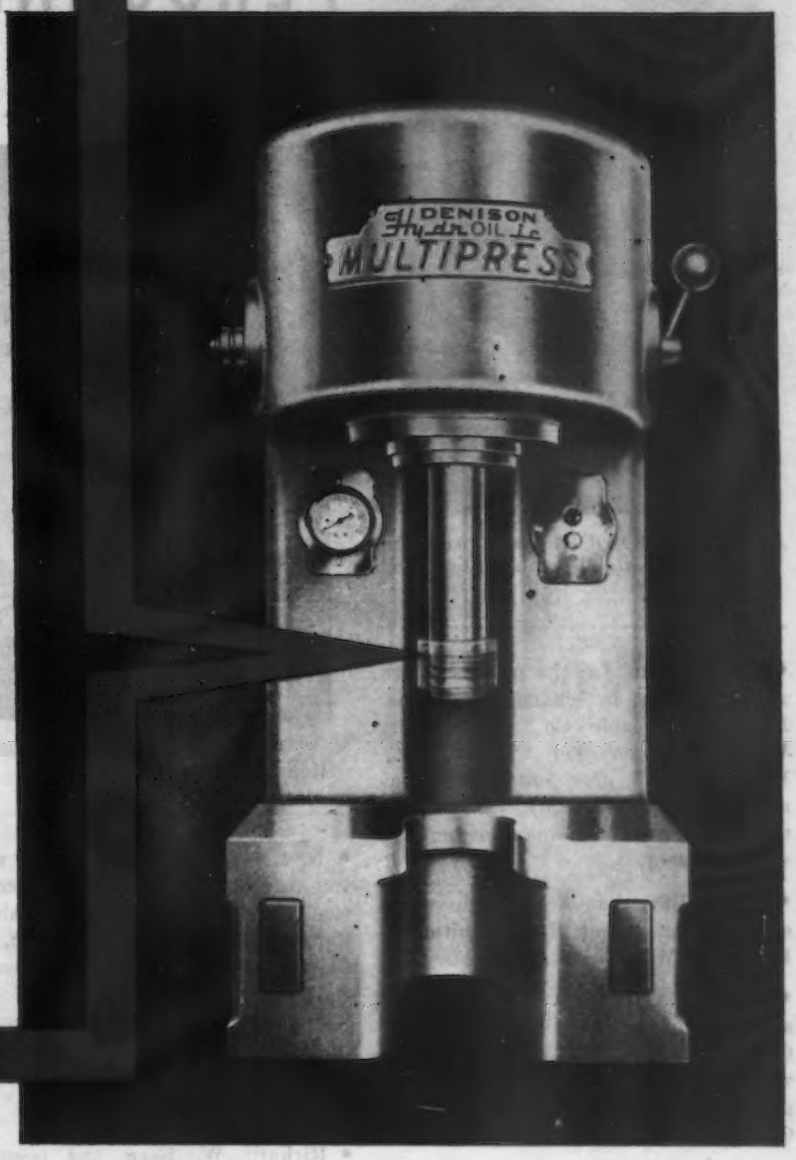
Washington

• • • Recommendations by the WPB that two government-owned plants be declared surplus by the RFC were reported July 31. The two plants which are no longer essential to the war effort, WPB said, are the Kalunite, Inc., alumina plant, Salt Lake City, and the Brewer Mfg. Co. assault wire plant, Williamsport, Pa.

Where can YOU use this amazing new *VIBRATORY* ram action?

(Oil-Hydraulic)

Ram action that permits short, rapidly-repeated uniform pressure strokes of regulative length, frequency, pressure and number per ram cycle



● So many startling advantages have been found in this new *exactly-controlled vibratory ram action* that, thus far, even we know only a few of its potential applications. Performance tests indicate that it may *revolutionize* scores of operations!

If your production includes *any* operation which you think might be improved by rapidly-repeated, uniform-pressure strokes, Denison engineers will be glad to adapt Vibratory HydrOILic Pressure to your specific needs! Write for information today!

* * *

This new vibratory hydraulic pressure principle is available in the equally amazing Denison Multipress—a four-ton and six-ton bench-size oil-hydraulic machine tool that performs almost any type of production operation calling for controlled pressure. *Let us send you the latest, fully-illustrated bulletin on* MULTIPRESS.

The DENISON Engineering Co., 1158 Dublin Road, Columbus 16, Ohio

DENISON
EQUIPMENT APPLIED
HydrOILics

HydrOILics
INDUSTRY'S RIGHT HAND

PERSONALS

J. M. SCHLENDORF, vice-president in charge of sales, Republic Steel Corp.

N. J. CLARKE, senior vice-president, Republic Steel Corp.

ROBERT H. GARDNER, general manager of sales, A. M. Byers Co.

• **C. L. Liebau**, for the past 11 years vice-president in charge of sales, Federal Malleable Co., West Allis, Wis., has taken over the duties of **W. J. MacNeill**, president and general manager, resigned. Mr. Liebau will take charge of the management as vice-president.

• **L. R. Burr** has been made chief engineer, succeeding **H. W. Whitmore**, Kold-Hold Mfg. Co., Lansing, Mich.

• **Charles D. Gritman** has been made sales manager, Hackensack Cable Corp., Hackensack, N. J. Mr. Gritman was, for the past eight years, vice-president of Paulsen Webber Cordage Corp., New York.

• **Hobart C. Ramsey**, executive vice-president of the Worthington Pump & Machinery Corp., East Harrison, N. J., has also been named president of the Ransome Machinery Co., Dunellen, N. J., a subsidiary. **J. G. Ten Eyck**, formerly president of Ten Eyck, Inc., has been made vice-president and general manager of the Dunellen plant.

• **L. J. Edwards** has been appointed field manager, supervising the field engineering and sales activities of General Alloys Co., Boston. Mr. Edwards was formerly New England district manager. **B. W. Bittner**, formerly assistant manager of the Engineering Dept., has taken over Mr. Edwards' former duties.

• **Oscar C. Schmitt** has been elected president of The Emerson Electric Mfg. Co., St. Louis. He succeeds **W. Stuart Symington**, who has become chairman of the Surplus Property Board.

• **N. J. Clarke** has been elected senior vice-president and **J. M. Schlendorf**, vice-president in charge of sales of Republic Steel Corp., Cleveland. Mr. Clarke has been vice-president in charge of sales for Republic since September 1930, and has been succeeded in that position by Mr. Schlendorf, formerly assistant vice-president in charge of sales.

• **Richard W. Berg** has been appointed district engineer for the Pittsburgh territory of the Bantam Bearings Div., The Torrington Co., South Bend, Ind. Prior to joining the division in 1944, Mr. Berg was employed by Mesta Machine Works, West Homestead, Pa.

• **Lester A. Lanning**, assistant plant manager of the General Motors Corp.'s New Departure Ball-bearing plant at Bristol, Conn., has been named plant manager of the GM's Sandusky plant which is to be constructed as soon as conditions permit. **Don C. Alexander**, formerly cost accountant at Bristol, has been made resident controller.

• **Robert F. Nelson** has been elected vice-president and assistant to the president, R. G. LeTourneau, Inc., Peoria, Ill. Mr. Nelson was formerly vice-president and director of the Arma Corp.

• **Robert H. Gardner** has been appointed general manager of sales, A. M. Byers Co., Pittsburgh. Mr. Gardner has been manager of Byers' Washington office since 1933, except for a four-year period when he was manager of the company's steel pipe sales. He succeeds the late Myron J. Czarniecki. **H. R. Rowland** has been made assistant general manager of sales.

• **Hugh H. Buchanan** has been appointed director of foreign operations for Shovel & Crane Div., Lima Locomotive Works, Inc., Lima, Ohio, and the Michigan Power Shovel Co., Benton Harbor, Mich. Until recently, Mr. Buchanan was vice-president and general sales manager of the La-Plante-Choate Mfg. Co., Cedar Rapids, Iowa.

• **R. S. (Jack) Rheay** has been named division sales manager for the southeastern United States for the Osgood Co. and General Excavator Co., Marion, Ohio.

• **A. P. Ford** has been appointed advertising manager of the American Society for Metals.

• **Rodman B. Doremus** has been promoted from vice-president to executive vice-president and **Francis J. Tytus**, from chief engineer to vice-president and chief engineer, F. H. McGraw & Co., New York. Mr. Doremus is also acting as president in the absence of **Clifford S. Strike**, who is now in Germany as chief of the Building Materials & Housing Branch, Economics Div., U. S. Group Control Council for Germany.

LINDBERG BRAZING FURNACE saves its cost in 96 days says ZENITH

"A large order of parts for government equipment required precision copper brazing," Zenith reports. "These are being handled with a Lindberg Brazing Furnace having a chamber 10" x 24" x 8" and we are turning out 172 gross pounds an hour continuously. This is in excess of the rated capacity of the furnace and compared to the cost of having this work done outside is saving enough to pay the full cost of the furnace and installation in 96 working days."

Get all the facts about this cost-cutting, time-saving atmosphere furnace for copper and silver brazing, sintering of powder metals, general tool hardening, high speed tool hardening and bright annealing. Temperatures up to 2500° F.

LINDBERG ENGINEERING COMPANY
2452 WEST HUBBARD STREET, CHICAGO 12, ILLINOIS

LINDBERG *Furnaces*

SUPER-CYCLONE • CYCLONE • HYDRYZING • BRAZING

ROLAND W. BURT, manager, Tubular Products Div., Joseph T. Ryerson & Son, Inc.

• **Roland W. Burt** has been appointed manager of the Tubular Products Div., Joseph T. Ryerson & Son, Inc., Chicago. Mr. Burt became associated with the company in 1923 and has served for 22 years in various sales capacities. Most recently, he was Eastern manager of railroad sales, located in the New York plant.

• **Dan A. Farrell**, foundry superintendent of the South Chicago plant, Carnegie-Illinois Steel Corp., Pittsburgh, has been appointed supervisor of safety. **Robert M. Jones** has succeeded him as foundry superintendent in the South Chicago plant.

• **W. D. Turnbull** has been appointed general sales manager, Kennametal Inc., Latrobe, Pa.

• **J. J. Kraus**, until recently a Major in the Washington office, Chief of Ordnance, and previously with the Detroit office of Sharon Steel Corp., Sharon, Pa., has been appointed sales vice-president of Detroit Seamless Steel Tubes Co., Detroit. He has succeeded **C. H. Hobbs**, resigned.

• **J. C. Baker** has been appointed district representative in the eastern Ohio, western Pennsylvania, and West Virginia territory for the Rheem Research Products, Inc., Baltimore.

• **Harry J. Billica** has been appointed Pacific district manager, Copperweld Steel Co., Glassport, Pa.

• **Robert L. Klein** has joined the Massachusetts Pressed Powdered Metal Corp., Worcester, Mass., as development engineer.

• **Richard T. Nalle**, for the past 20 years vice-president in charge of operations, Henry Disston & Sons, Inc., Philadelphia, has been elected executive vice-president, The Midvale Co., Philadelphia, a newly-created post, effective October 1. He also was elected a director of the company.

• **Robinson Ord**, formerly an assistant general manager of sales, has been appointed general manager of sales of the organic division, Monsanto Chemical Co., St. Louis. **Arthur P. Kroeger** has been appointed an assistant general manager of sales of the organic division and **Charles H. Sommer, Jr.**, will be responsible for sales of intermediates as well as plasticizers and resins.

• **E. J. Garrigan**, formerly vice-president and factory sales manager, has been appointed vice-president in charge of sales, The Okonite Co., Passaic, N. J., the Hazard Insulated Wire Works Div., and its affiliate, The Okonite-Callender Cable Co., Inc. **C. E. Brown, Jr.**, formerly vice-president in charge of the company's Washington, D. C., office has been appointed vice-president and general sales manager to coordinate the activities of the executive offices in Passaic with the company's branch offices.

• **Frank E. Farrell**, former district manager for Howell Electric Motors Co., Detroit, has been named assistant to the director of automotive sales, Bendix Products Div., Bendix Aviation Corp., South Bend, Ind. **Roy C. Allan** and **L. F. Freiburg**, until recently "on loan" to the Zenith Div., Detroit, has resumed direction of Stromberg automotive carburetor sales.

• **Raymond E. Olson** has been made general sales manager, Taylor Instrument Co., Rochester, N. Y.; **Frank S. Ward** has been named industrial sales manager; and **Ralph E. Clarridge**, sales engineering manager, succeeding Mr. Olson.

• **H. J. McPeak**, former director of General Motor's South American sales, has been made manager of export sales, Food Processing Div., Enterprise Engine & Foundry Co., San Francisco.

• **Don Poor** has been appointed advertising manager of Ceco Steel Products Corp., Chicago. Mr. Poor was formerly assistant advertising and sales promotion manager of Lyon Metal Poducts, Inc., Aurora, Ill.

• **Russell J. Wittmer** has been appointed Philadelphia district sales manager, and **William M. Blackmore**, southeastern district sales manager, National Malleable & Steel Castings Co., Cleveland. Mr. Wittmer has succeeded **Edward O. Warner**, retired.

• **R. A. Armstrong** formerly general sales manager, has been elected vice-president in charge of sales, Michigan Seamless Tube Co., South Lyon, Mich.

• **A. S. Haagman** has resigned from Foster-Wheeler Corp. and has joined Simon Holland & Son, Inc., Brooklyn, as sales engineer in charge of sales.

• **Rhoades V. Newbell** has been appointed manager of the advertising and sales promotion division of the Deepfreeze Div., Motor Products Corp., North Chicago, Ill.

• **Robert W. Morgan** has been appointed chief engineer, Fedders Mfg. Co., Inc., Buffalo.

OBITUARY.....

• **Philip B. Gale**, chairman of the board of directors of the Standard Screw Co., Hartford, and its subsidiaries including The Hartford Machine Screw Co., died July 25. He was 71 years old. Mr. Gale, also, had been chairman of the board of directors of the Western Automatic Machine Screw Co.; president, Worcester Machine Screw Co., and a director of the Chicago Screw Co.

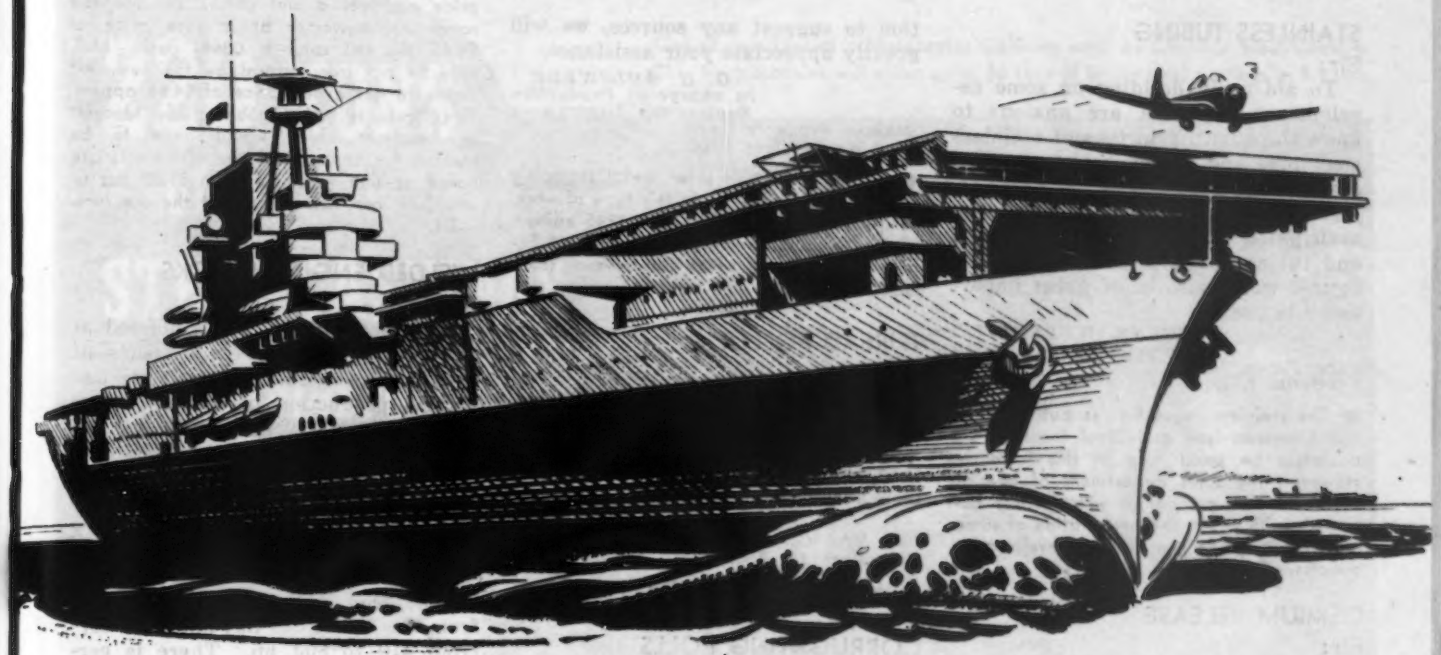
• **Sherman E. Welch**, for several years general manager of the Chrysler Corp. plant at New Castle, Ind., died recently at Detroit.

• **William H. Bryant**, 54, Chicago sales manager of Joseph T. Ryerson & Son, Inc., Chicago, died July 23. Mr. Bryant became associated with the Ryerson company in 1906, and had risen to his present post through 40 years of successful selling in the steel industry.

• **Jack H. Wilson**, 49, who represented A. Finkl & Sons Co., Chicago, and the Hill Acme Co., Cleveland, as Cincinnati sales engineer, died July 25 following an automobile accident.

• **Capt. Arthur E. Huff**, former research chemist for Monsanto Chemical Co., St. Louis, died December 15, 1944, while being transported on a Japanese vessel as prisoner of war. He was Corregidor hero.

"It's Steel!"

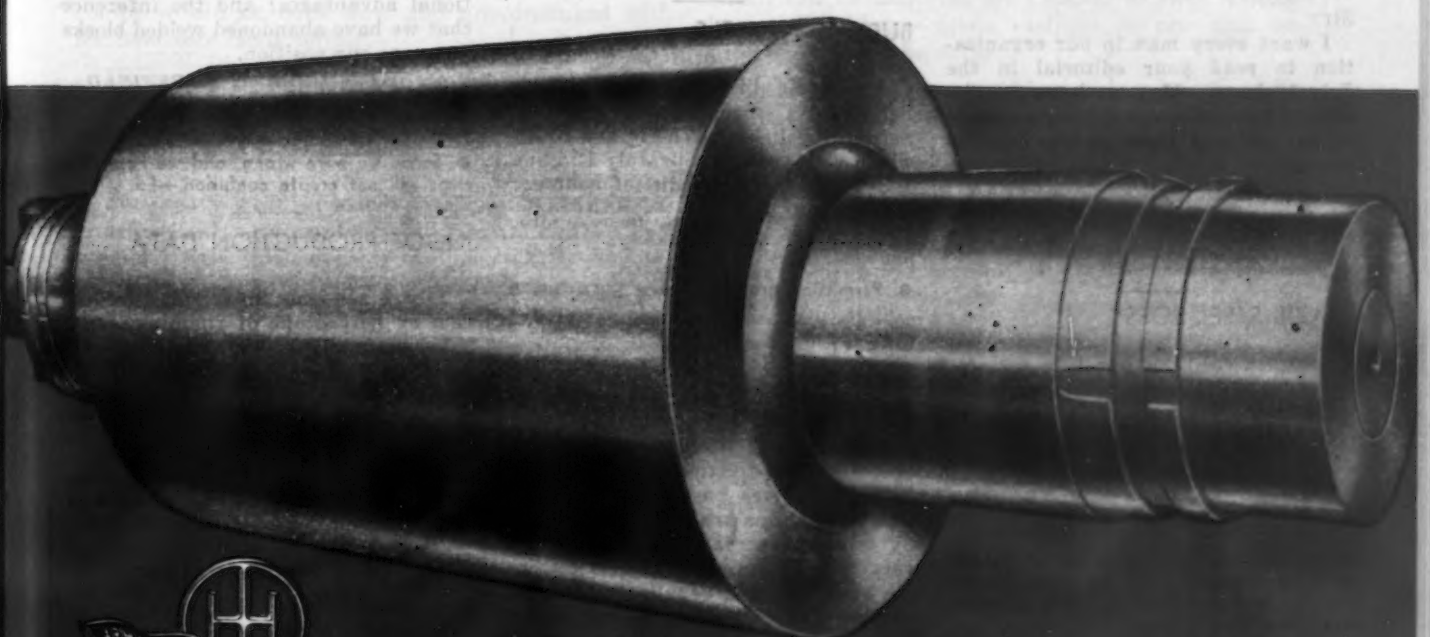


And when you've said that, you've said it all. Unquestionably, the words "It's Steel!" carry with them the fullest measure of confidence, whether the end use is a mighty battle fleet or simpler, less costly items.

Through the years the story of steel has been one of conquest over seemingly insurmountable production obstacles—a story of strength, of durability, of adaptability. These are the factors which help make this commodity a priceless asset of civilization.

In tomorrow's world, steelmakers have their work cut out for them. Stimulated by wartime restrictions and encouraged by the progress of science, peacetime demand will be great—production just as great.

Ohio Steel, therefore, faces a task of equal magnitude and one for which we have long been ready—that of producing the finest rolls we have ever made, and in the shortest possible time.



ENGINEERS
FOUNDERS
MACHINISTS

Ohio Rolls

THE OHIO STEEL FOUNDRY COMPANY

Dear Editor:

STAINLESS TUBING

Sir:

To aid us in deciding on some development work we are anxious to know the quantity in tons of stainless steel pipe and tubing sold each year from 1938 through 1944. If any projected figures are available on the anticipated use of stainless steel pipe and tubing for 1945 and 1946, these figures would also be of great importance to use.

GENE WEDEREIT
Director of Advertising
Tube Turns, Inc.
Louisville 1, Ky.

● The stainless ingot figures published by the American Iron and Steel Institute will doubtless be small help in this instance. However, the sales department of one of the producing companies will possibly cooperate with you in the preparation of some material to guide you in your development policies.—Ed.

OSMIUM RELEASE

Sir:

In your July 5 issue you ran an article headed "Canada Releases Most of Platinum Group Metals." Will you please give me the source of this information, and on whose authority it was given out? Our interest centers around osmium.

M. A. MILLER
M. A. Miller Mfg. Co.
Chicago

● The source for this news item was our Toronto correspondent.

THE CAN-BE-DONERS

Sir:

I want every man in our organization to read your editorial in the July 19 issue. May we have permission to have mimeograph copies made so we can post them on our bulletin boards?

I. H. STAUFFER
President
Stauffer, Eshelman & Co.
New Orleans 1, La.

● Permission granted.—Ed.

BRAZIL STEEL JOBS

Sir:

I am interested in obtaining the address of the Brazilian National Steel Co. in New York. I would like to know whom to contact in regard to a position with that company.

JAMES S. ALBRIGHT
1824 Martina Ave.
Torrance, Calif.

● Applications for employment at the mill at Volta Redonda may be made to the Brazilian National Steel Co., 570 Lexington Ave., New York City.—Ed.

TRIM CAP SOURCE

Sir:

We desire to obtain some trim caps capable of being slipped over a pin and clipped into a groove at assembly. Enclosed print will illustrate what we have in mind. If you are in a position to suggest any sources, we will greatly appreciate your assistance.

G. H. AHLSWEDE
In charge of Production Engineering Department
Bohlens Products Co.,
Port Washington, Wis.

● Almost any small sheet metal stamping firm should be able to do this type of work. For further information see the 1945 edition of the American Society of Mechanical Engineer's catalogue which lists several score such firms.—Ed.

THREAD ROLLER

Sir:

We noticed that in your July 12 issue you had a listing of various companies as manufacturers of rolled threads. We wish to advise that we also are makers of rolled threads.

A. S. CAPRON, JR.
Oda Mfg. Co.
Milwaukee 12, Wis.

● We are glad to make this note.—Ed.

CORRUGATING ROLLS

Sir:

Could you inform us of some company that manufactures rolls for rolling or bending corrugated sheet metal?

LOUIS BILA
Manager
Big Rock Plow Co.,
Chesaning, Mich.

● Suggest that you contact Peck, Stow & Wilcox Co., Middles Street, Southington, Conn., or Kane and Roach, Inc., Syracuse, N. Y. Both of these companies are builders of large and small sheet metal working equipment.—Ed.

BUFFING WHEELS

Sir:

We would like to reprint in our September issue the article "Spray Setup of Polishing Wheels and Buffs" which appeared in your July 12 issue. We will give full credit, of course.

E. D. MERRIAM
Sales Representative
Seemann & Peters Inc.
Saginaw, Mich.

● Permission granted.—Ed.

ORE PRICES

Sir:

Your Lake Superior ore prices are based on 51.50 pct Fe natural content, delivered lower lake ports. A footnote adds: "Adjustments are made to indicated prices based on variations of Fe content as analyzed on dry basis by independent laboratories." I am very much interested to know what the premiums and penalties are on Fe content above 51.50 pct, as well as for contents of silica, alumina, phosphorus and sulphur. In short, about what price can be expected for a taconite concentrate of 60 pct plus iron, such as my company expects to produce?

C. W. TANDY,
Engineer
Reserves Mining Co.,
Babbitt, Minn.

● Pricing of ore is a fairly complicated matter. A 60 pct concentrate would mean about 10 pct moisture, and about 54 pct iron natural. Divide 51.50 pct into the base price and get a unit value. For Mesaba range non-bessemer at a base price of $4.45, the unit value is .08641 cents. Multiply 54 pct iron natural by the new unit figure to get a new price of $4.68 approx. This figure is for a good grade Mesaba non-bessemer which would have to be treated for commercial use. Premiums are based on unit value up from 51.50 pct to whatever iron natural content the ore runs. —Ed.

WELDED ENGINE BLOCKS

Sir:

We were a little bit nonplussed at the implications in recent issues of THE IRON AGE that, whereas we had started production of diesel engines with fabricated, welded blocks, we had now seen the error of our ways and returned to cast iron blocks. There is an element of truth in such an implication, but it is subject to very strong reservations.

Our fabricated engines continue to be produced in two series, the "50," from the 350 to 675 hp; and the "60," from 410 to 800 hp. There is certainly no prospect at present that use of cast blocks is contemplated on these engines. Our cast engines, just announced officially, are likewise in two series, the "20," 190 to 250 hp; and the "30," 200 to 265 hp. These were designed with a cast block and will continue to be so produced.

Our perturbation is based on our extreme satisfaction with the welded construction of our larger engines, particularly in view of a new fabrication technique which is giving it additional advantages; and the inference that we have abandoned welded blocks damages our position.

CARLTON A. SHEFFIELD,
Public Relations Dept.
Joshua Hendy Iron Works,
Sunnyvale, Calif.

● Sorry, we were wrong, and we hope the error will not create confusion.—Ed.

INGOT PRODUCTION DATA

Sir:

Please send me ingot steel production by percentage of rimming, semi-killed and killed steel for 1938 and later years, if available.

J. A. FINLEY,
Research Engineer
Battelle Memorial Institute,
Columbus 1, Ohio

● Sorry, but we have been unable to develop a source for these statistics, which have apparently not been compiled.—Ed.

CHOOSING CONSULTANTS

Sir:

It is time some authoritative voice was raised against the unethical practices for which we all have to suffer and Mr. Brady ("Choosing the Consulting Engineer"—July 5 issue), with your support, has said it very well.

LUCIEN I. YEOMANS
Lucien I. Yeomans, Inc.,
Chicago, Ill.

220 TONS of STEEL CASTINGS *Wheelabrated in* 8 HOURS

One of two Special Wheelabrator Cabinets used by Crucible Steel Castings Co. Each machine will clean up to 80 tons of heavy steel castings in 8 hours.

When Crucible Steel Castings Co. of Milwaukee was getting into heavy production of electric steel castings for war equipment, it was found that the majority of the work was too large and bulky for standard blast cleaning machines, and individual handling in blast rooms would be both slow and uneconomical with the available labor supply.

The answer to this problem was found by installing two Wheelabrator Special Cabinets for cleaning the heavy castings and two 48" x 72" Wheelabrator Tumblasts for the smaller work.

The heavy green castings, with gates and risers attached and many containing cores, are cleaned in a special 3-pass Wheelabrator Cabinet, where they are carried on hooks in an S-shaped path before three Wheelabrator units and rotated for a pre-determined time within each blast stream. The position of each Wheelabrator is staggered to assure complete blast coverage of all sizes of work.

A 2-pass Wheelabrator Cabinet is utilized for finish blastings after annealing, while the smaller castings, which can be tumbled, are cleaned in two Wheelabrator Tumblasts—green castings in one and annealed work in the other.

American's solution to this problem has provided efficient cleaning on a mass production basis—220 tons in 8 hours.

BRIEF FACTS ABOUT WHEELABRATING

Airless Wheelabrating, in which abrasive is thrown in a continuous, controlled stream from a centrifugal wheel, is synonymous with high-speed, low-cost cleaning performance. Compressed air, with its costly power and equipment requirements, is entirely eliminated. Three hundred pounds of abrasive per minute, hurled by the standard 19½" diameter wheel, completely scours heavy loads brilliantly clean in a few minutes.

Get This Free Booklet

If you are planning further modernization of your plant, now or in the post-war period, write us for a copy of "The American Line". It gives information on: Airless Wheelabrator and Airblast Equipment, Wheelapeening (shot peening) equipment, Dust Collectors, Sandcutters, Core Rod Straighteners and Metal Washing machines.

American FOUNDRY EQUIPMENT CO.

510 S. BYRKIT STREET — MISHAWAKA, INDIANA

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

This Industrial Week . . .

- ***Military Steel Demand May Drop***
- ***Extended Deliveries Still Prevail***
- ***Ingot Rate Drops Three Points***

INDICATIONS are mounting that the military appetite for steel for prosecution of the Japanese war may be nearly satisfied within the next 60 days. Consumption after that period will be determined by immediate requirements, always subject to revision, but long-range needs will gradually shrink.

Continuing pressure from business and political quarters may compel the military to disgorge tonnage which has clogged mill schedules. Until this prospect becomes reality, however, civilian producers must still live on hope alone. The first tangible indications that a home had been found for the bulk of most "must" requirements for sheet steel products came from last week's notification to the mills by WPB that third quarter sheet schedules had been unfrozen. If no rated orders are on hand, mills may insert unrated civilian orders to plug whatever holes may appear in schedules. Prior to the freeze early in July such spot openings had afforded minor tonnages for the automotive industry and others. Current prospects are that spot openings before the end of September will be few and tonnages thus made available small. Keeping a close check on the mill diet, WPB still requires that openings must be reported to it before new orders are scheduled for production.

Reduced ordering for military needs last week widened the gap by which rated order volume now trails civilian ordering. A cutback in helmet steel opened some mill space although the tonnage involved was insufficient to succor civilian hopes greatly. Navy orders for 80,000 tons of plates and 47,900 tons of structural steel reported last week were blown up this week to include an additional 40,000 tons of structural tagged for rush production, delivery of the entire tonnage is to be completed this month. A Navy order for 27,000 pontoons for delivery from May through August, 1946, is in the wind.

Bad news for civilians lies in comparison of delivery dates currently quoted by mills with those prevailing a month ago. Plate orders have kept pace with production making October the earliest available date compared with September quoted last month by the larger producers. Navy orders have fallen heaviest on Western mills whose backlog had been severely depleted. The Navy orders also have pushed structural deliveries as far back as December from September offerings made last month. Carbon bar deliveries still are quoted for December by most mills, although quality grades now are not available until February. Strip deliveries continue on a four to five months basis, with some independent producers having earlier openings. The barrier facing would-be civilian buyers, unless relief materializes, is indicated by sheet deliveries extending into March, 1946. Cold rolled sheets, chief concern of the automotive industry, have become only slightly easier, with December schedules still holding the first openings.

PIG iron producers are watching carefully possibility of coal shortages this winter. Assuming continuation of heavy pig iron demand, lack of coking quality coal necessary for pig iron production could strike a heavy blow whose repercussions would be felt almost immediately by the foundries if not the steel industry itself. Merchant pig iron producers are panting to meet demand currently in many districts.

The armed services are progressing rapidly toward a direct settlement program for termination claims by steel producers. Instead of securing payment from customers whose manufacturing contracts have been cancelled, the mills will negotiate directly with a contract officer. The contract officer will be empowered, it is understood, to authorize and approve settlements for the Navy, Army, Treasury Department, and Maritime Commission even though the orders involved are from a third or fourth tier contractor. The steel producer must secure from the prime contractor a certification that the material in question is allocable to the job for which it is charged. Indicating that the wheels of this program are beginning to turn, one major steel producer last week reported that a contract officer had been assigned to it.

THE Army is indicated to have placed orders for 303 locomotives with American builders. Concurrently, cancellation has been made of 290 of a total of 500 locomotives slated for shipment to Russia. Of the new Army order, 81 locomotives were allocated to Baldwin Locomotive Works, 76 to American Locomotive Co., and 46 to Davenport-Besler Corp. Mt. Vernon Car Manufacturing Co. has received orders for 300 50-ton steel box cars from the Clinchfield Railroad Co., 250 from St. Louis Southwestern Railway Co., and 400 from the Louisville and Nashville Railroad. American Car & Foundry Co. secured orders for 40 cabooses from the Alton Railroad, and 400 50-ton box cars, and 200 50-ton automobile cars from Louisville and Nashville.

Steel ingot operations declined three points this week to 88.5 pct of rated capacity. In Pittsburgh, the operating rate fell half a point to 88 pct, and in Chicago output decreased one and a half points to 93.5 pct. A strike at the Brier Hill plant of Youngstown Sheet & Tube Co. brought the Youngstown district rate down nine and a half points to 82.5 pct. Other district declines included Philadelphia, down half a point to 90.5 pct; Wheeling, down one point to 90 pct; Cincinnati, down eight points to 94 pct and the Eastern district, down six points to 85 pct. Cleveland operations gained two points to 96 pct, Detroit three points to 100 pct and the Western district, four points to 77 pct. Manpower shortages contributed to a drop in the Buffalo rate to 96 pct last week and this week's rate failed to climb above that figure. Birmingham at 94 pct and St. Louis at 87 pct continue unchanged.

• **WRIGHT STRIKE**—The Wright Aeronautical plant at Lockland, Ohio, was early in the week completely closed as a result of a strike involving about 23,000 employees. UAW-CIO contends that the company has failed to settle 9000 grievances. The company denies the statement while stating that 14 foundry workers were laid off because they refused to accept transfers to lower paid jobs, thus causing the strike.

• **ALLEGHENY EXPANSION**—Allegheny-Ludlum Steel Corp. is completing a $150,000 addition to its Buffalo works which will increase plant space approximately 50 pct and productive capacity 40 pct. New heat-treating furnaces and finishing equipment are included.

• **BLAST FURNACE RECORD**—A new world's blast furnace record was made in July by the No. 2 blast furnace at the Edgar Thomson Works of Carnegie-Illinois Steel Corp., with a production for the month of 50,590 tons. The previous record was held by Great Lakes Steel Corp., which has a furnace that produced 49,705 tons in 1943. The new record is more unusual because it was made without scrap charges, according to the company. In making the new monthly record, the furnace set two new weekly records and a daily record. The best weekly record was for the week ending July 26, when 12,189 tons of pig iron were produced and the best daily record was made on July 12, when the output totaled 1976 tons or 48 pct over the 1330 ton rated capacity of the unit. The monthly production was 23 pct over the rated capacity of the furnace.

• **STORAGE CASES**—Production will begin shortly for the Army on the hermetically sealed, all-welded steel containers for the long time preservation of artillery materiel. While sample containers for storing guns and probably ammunition have been made and accepted, equipment for large scale production will not be completely installed at American Bridge Co., before late August. The schedule now calls for about 700 containers to be delivered during September and October, but it is expected that this order will be boosted. The plans for similar containers for the storage of tanks have been abandoned temporarily. Dravo Corp. was indicated to have been in line for this order, but it may be some time before the program is revived and any such units constructed.

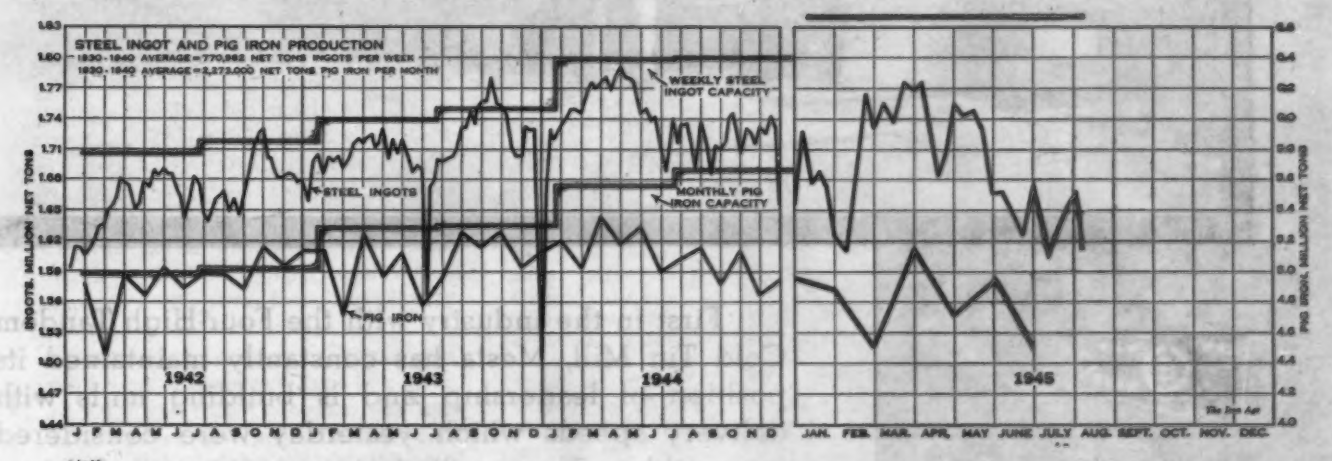
• **RUSSIAN BEARINGS**—Although plans are not complete, indications are that the Timken Roller Bearing Co. will help Russia build the largest anti-friction bearing plant in the world. This was revealed by William E. Umstaddt, Timken president, who recently returned from a brief stay in Russia where he discussed the project with Soviet industrialists. Timken engineers will provide technical advice in the undertaking. However, it will be at least two months before plans can be completed. Mr. Umstaddt predicted that "Russia will be a profitable export market for American goods for many years," adding that the danger of Russia turning into a competitor nation "is slight, because it will take them 25 to 50 years to satisfy their own wants."

• **COAL LOSSES**—Losses of coal production through strike during the period of April 1-Aug. 2, aggregated 12,372,628 tons, according to Solid Fuels Administrator Harold Ickes, who is strongly urging that 6,000,000 tons be shipped to Europe, and who predicts that America faces a cold winter because of lack of fuel. The four-month strike losses consisted of 3,655,406 tons of anthracite and 8,717,222 tons of bituminous coal.

• **SAE RESTRICTIONS LIFTED**—The WPB Steel Division on July 19 lifted restrictions on SAE alloy steels. This automatically removes controls over NE steels as well. Through an oversight removal of the restrictions were not made public until Aug. 7.

In a letter announcing suspension of its controls heretofore exercised under M-21, the Steel Division urged consumers to retain the present triple alloy steel pattern and to continue to specify the lowest alloy steels that will meet engineering requirements in order to avoid the possibility of reinstating the controls.

The suspension of controls, the Steel Division pointed out, means that consumers can secure for rated and unrated orders the grades of alloy steels desired. At the same time, however, it was stated that Forms WPB 2933, 1770 and 3580 are to be filed as heretofore.



Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
July 31	89.5	95.0	92.0	90.5	94.0	96.0*	91.0	94.0	97.0	73.0	102.0	87.0	91.0	91.5
August 7	89.5	93.5	82.5	90.0	96.0	96.0	90.0	94.0	100.0	77.0	94.0	87.0	85.0	88.5

* Revised

Atomic Bomb Development Kept Steel Industry Guessing for Years

New York

• • • Individual threads of steel industry activity which were woven into the finished fabric of development of the atomic bomb date back to the late thirties.

Obscure, terse reports of fabricated steel inquiries and awards revealed the construction at the University of California of, first, a small cyclotron or atom-smasher; then, when its success was established, a larger cyclotron requiring more than 3000 tons of heavy gage plate for the base and several hundred tons of structural steel for the frame.

The original University of California cyclotron was the medium for experiments by Dr. Ernest Orlando Lawrence of the university which led to his winning the Nobel prize in recognition of his successful atom smashing. Dr. Lawrence's colleague, Dr. J. Robert Oppenheimer directed the development of the final atomic bomb.

This was long before the atomic bomb was discerned as the end product of atom smashing research, and steel later went to construction of cyclotrons or laboratories at the University of Chicago, Columbia University, Iowa State College and at industrial plants.

The apex of construction steel requirements for the project was reached with erection, beginning in 1943, of the vast Hanford Engineer Works plant with its scattered buildings cuddled in the lonely, rolling wheatlands of southeastern Washington and the Clinton Engineer Works near Knoxville, Tenn. By this time the project was shrouded with tight-lipped secrecy. No one in the industry told—and it is a good guess that no one knew—what type of plants would be built from the tens of thousands of tons of structural steel purchased. Even with heavy structural requirements for plant construction common at the time, these top priority projects aroused curiosity.

Speculation centered around development of some new type of rocket, although the rocket program was well underway at the time. Identification of du Pont with the Washington project further threw guessers off the track, sending them sniffing down the blind alley of a possible powder plant. Few connected the Tennessee plants operated by the Tennessee Eastman Corp. and Union Carbide and Carbon Corp. with the Washington project.

Much of the heavy structural steel was rolled at the South Chicago plant of the Carnegie-Illinois Steel Corp. Stainless steel and alloys also came from this mill in quantity, with further treatment at Gary.

Contracts for fabrication of steel were widely spread among companies and geographically, but the size and importance of the project were unmistakable.

"We didn't know what it was, but boy we knew it was big," one mill official recalls. "And the super-duper directives and mysterious references to the Manhattan District project left no doubt that it was something hot."

Purchase of large tonnages of various types of steel other than structurals starting somewhat over a year ago, all for the "Manhattan project" started some guessers on the right track. One order, distributed among several mills, called for about 45,000 tons of plates of gages ranging from 2¾ to 4½ or 5 in. These were to be about 57 in. square, and extreme gage accuracies had to be maintained. It was indicated that these squares had to be planed after delivery. This order called to mind the old University of California cyclotron.

Then a later and somewhat smaller order for the Manhattan District job called for several thousand tons of 11 ga. sheets, to be stretcher leveled. Activities of a Colorado mine producing uranium ore heightened speculation.

Early this year, editors of THE IRON AGE put their heads together, guessed and correctly identified the import of the Manhattan project, the location of the Washington and Tennessee plants and the New Mexico proving ground. This was possible chiefly through familiarity with the backgrounds of personnel working on the project. The story was pure speculation, of course, as nothing could be verified. Censorship killed it deader than a doornail.

Not even the plants working on the project—there are said to be about 52 of them—knew the end use of their project, and contracts for components were so widely scattered that it was impossible to make even a good guess. For that matter, few wanted to know for the extreme emphasis upon secrecy hinted that knowledge might lead to a slip that would be fatal to this country in prosecution of the war. Last week these plants were told that the curtain would be drawn back on Sunday, but apparently the timing slightly miscarried. Now that the secret is out, there is a sigh of relief that American industry was in a position to provide material and know-how before enemy developments along similar lines overtook us.

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ALL-VETERAN SHOP: *Formerly a master sergeant in the Air Corps, Winthrop Delano is now employed as a mechanic at the Yule Industries plant in Quincy, Mass. The firm was organized by disabled vets to hire only World War II servicemen, and is repairing and rebuilding trucks.*

o o o

Warns Price Controls On Major Items Will Not Be Lifted Yet

Washington

• • • OPA's recent announcement of its plan to lift price controls in less important fields to speed the handling of reconversion pricing programs carried a warning by Price Administrator Chester Bowles that controls on major items in the American economy will be continued for the present.

Claiming that inflationary pressures will continue strong, Mr. Bowles pointed out that many heavy consumer goods, such as automobiles, electric household refrigerators, vacuum cleaners, home radio sets and other items have been out of production and will require firm ceilings until production reduces or satisfies the huge pent-up demand.

Effective July 25, the procedure and rules for suspending price controls on specific commodities were contained in Directive No. 68, issued by the Office of Economic Stabilization which has the power to authorize the Price Administrator to suspend price control for specific items.

The Price Administrator is authorized under Directive 68 to remove controls under the following circumstances:

1. When, in his judgment, the action will not result in an increase in the general level of prices of the item involved.

However, if the commodity is one that enters significantly into the cost of living, the Director of Economic Stabilization will be notified of the proposed suspension or exemption. If the Director does not disapprove the action within five days, the suspension or exemption order may be issued by OPA. In all these cases exemption must be preceded by a trial period of suspension.

2. When the following three conditions are met: (a) The commodity or service does ont enter significantly into the cost of living or into business costs; and (b) continued control involves administrative difficulties out of proportion to the effectiveness of control or the contribution to economic stabilization and (c) suspension or exemption presents no threat to diversion of materials, plant facilities or manpower from war production or production of other commodities, and does not impair effective price control on other items.

Urge Junking Small Lots of Surpluses

Chicago

• • • Pointing out that warehouse space was at a premium, Joseph P. Woodlock, associate director of the surplus property activities of Reconstruction Finance Corp. recently urged that "nominal quantities" of contractors' inventories arising from contract termination and items which "fall into a twilight zone of doubtful determination" between usable property and scrap be junked.

Expense of packaging, crating, preparation and transportation of inventories for shipment to storage centers would not be justified on doubtful items, he contended.

"The RFC has, or will have, acquired a sufficient amount of storage space to meet impending plant clearance and contract termination inventory requirements," he said. "Scrapping at plant level by Army clearance teams will aid RFC in maintaining its premium warehouse space for actual surplus, the sale of which will bring in a recovery that warrants storage."

E. C. Barringer, president of the Institute of Scrap Iron & Steel, Inc., supported Woodlock's advice, declaring that present favorable markets offered an excellent opportunity for disposition of surpluses. He recommended that termination inventories be grouped in related lots and sold as is. Bidding would indicate if any material was worth more than scrap value, he felt.

Price Changes Limited For Machinery Makers

Chicago

• • • Machinery manufacturers who continued to produce the same products during the war are not affected by the recently announced Office of Price Administration reconversion pricing procedures, Walter Shoemaker, price executive of the machinery branch of the OPA told a War Problems School session of the Chicago Assocation of Commerce Wednesday.

Present machinery branch regulations under which manufacturers who have exceeded their ability to absorb additional cost increases may obtain authority to raise their prices have not been changed by reconversion pricing procedures, Shoemaker said. These regulations, he asserted, provide ample relief for manufacturers over several years.

The speaker warned that OPA will not permit "starting costs" or costs due to war conditions that exist in the plants of individual manufacturers to be passed on to consumers. "Among these costs," Shoemaker said, "are overtime expense, inefficiency of labor, costs due to buying in quantities much smaller than normal or from more distant suppliers, and excessive overhead expense built up during war production."

The reconversion pricing policy which applies to goods out, or almost out, of production during the war was designed to permit prices which could be effective over a long period of time and still be fair to manufacturers, Shoemaker said. "This policy," he continued, "has been outlined to many industry advisory committees and has been generally accepted by them as being a fair approach to the problem."

SEAPLANE BASE: *Work speeds at a new Navy seaplane base on construction at Okinawa. Seabees dredged the coral, using the converted crane seen at the right.*

CMP Components Cut Frees More Unrated Reconversion Steel

Washington

• • • Reduction of fourth quarter controlled materials allotments earmarked for programmed B products, as recommended by the WPB requirements subcommittee, is expected to increase by approximately 500,000 tons the amount of unrated steel which may be available for production of civilian goods. This represents a decrease of 13 pct from a total of 3,600,000 tons allotted to programming in the third quarter.

This is in line with WPB's expressed policy of increasing quantities of "free" steel wherever possible by eliminating priorities in favor of distribution on an unrated basis during the reconversion period. By effecting this reduction, WPB hopes to improve the sheet and strip situation materially in the fourth quarter. There is little promise that relief will be forthcoming before that time.

Among those products which are said to figure heavily in the proposed cut are flat rolled products including sheet metal building items, refrigerators, galvanized ware, food processing equipment, heat exchangers, plumbing and heating equipment, compressors and laundry equipment.

Alloy steel allotments for the fourth quarter also are expected to be decreased by approximately 40,000 tons from a total of 450,000 tons in the third quarter. Hand tools, electrical equipment and special types of machines are said to account for a considerable portion of the decrease.

Military Producers Aided

Washington

• • • Priorities Regulation 30 which directs a B product manufacturer to apply by August 15 (Form WPB 4320) for a "rating percentage" in the event he is unable to get materials needed for 1946 military production through extension of his customers' MM ratings, was announced by WPB on July 30.

Manufacturers who have applied direct to WPB under CMP and PR 11-b, WPB said, are generally expected to get materials by extension of their customers' MM ratings but those who are unable to do so may apply under this new regulation.

In applying for a rating percentage, which, when approved by WPB, will indicate the percentage of 1946 orders ratable MM, information will be furnished on the value of rated military orders by symbols shipped in the second quarter 1945, July 1945 and estimated first quarter 1946 shipments.

MM ratings obtained under this regulation, WPB emphasized, may be applied only to orders calling for delivery in the first, second and third quarters of 1946, although such orders may be placed or converted from rated orders previously placed at any time after receipt of the authorization from WPB.

Direct assignment of ratings will probably continue only through the first quarter of 1946, WPB said, after which time a self operating system may be set up. Rating patterns are expected to be assigned by September 1, WPB said.

Rescheduling by CMP Producer Permitted Within Any Quarter

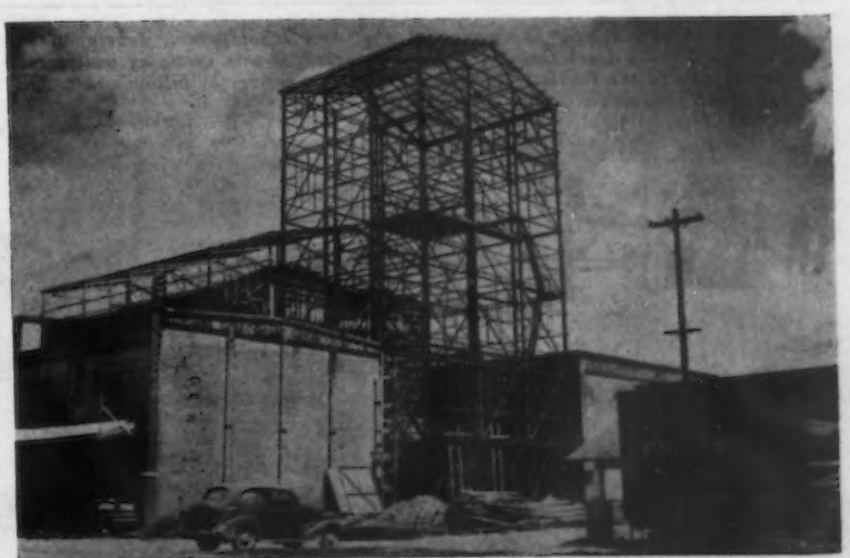
Washington

• • • Issued recently by WPB Interpretation 33 to CMP Regulation 1 explains that a controlled materials producer who is able to produce and deliver an authorized order in advance of the time permitted by regulations may in certain cases reschedule for an earlier date. This may be done if the earlier date is within the same quarter for which the order was originally scheduled, provided the producer gets agreement from his customer. This applies even though the production and delivery date may be in advance of the time permitted by paragraph (t) (4) of the regulation.

If the earlier date is in a previous quarter, it cannot be scheduled as an authorized controlled material order unless the customer is able to revalidate the order against an allotment for that quarter, the interpretation continues. However, if the customer does not have an allotment or does not wish to use it, the order can be scheduled and delivered as an unrated order with the customer's consent.

There is no prohibition in CMP Regulation 1 against the scheduling and delivery of unrated orders at a date earlier than that called for by the order, the interpretation adds. However, attention was called by WPB to the provisions of CMP Regualtion 2, relating to inventories, which forbid delivery of controlled materials in excess of the limits of that regulation. A producer should usually assume that the delivery date on a customer's order is the earliest on which he can accept delivery under CMP Regulation 2. Thus, before delivering controlled material substantially earlier or in greater quantities than is called for by his customer's order, a producer is required to satisfy himself that receipt by the customer will be within permissible customer inventory limitations.

MECHANIZED RICE: *Steel construction is being used for new buildings in the rice fields of Louisiana where dryers are being built with elevators and bins to handle increased rice production.*



Non-Integrated Firms Protest OPA Methods On Price Maximums

Washington

• • • "Unfair and arbitrary" formulas employed by OPA in establishing maximum prices for carbon steel in 1945 fell so far short of reality that they offset less than one-sixth of the indicated rise in steelmaking costs since 1939, a group of 23 small steel companies charged recently in a formal protest to OPA against the schedule of carbon steel prices announced May 21, 1945.

The protest was filed by Robert W. Wolcott, president of Lukens Steel Co., Coatesville, Pa., acting on behalf of his own company and other smaller steel companies which, in the aggregate, accounted for about 4,000,000 tons of steel in 1944.

Over the past six years, the protest said, the labor cost of the protesting companies has increased by approximately $6,700,000 on the basis of the 1939 output, while the cost of raw materials has risen an additional $8,250,000. As against that total increase of $14,950,000 in 1939 costs, the OPA in 1945 granted price relief equivalent to only $2,700,000 per year on the basis of 1939 volume, it was declared.

The schedule of ceiling prices for steel announced May 21, 1945, by the OPA, the statement charged, unfairly penalizes small steel producers who do not own and derive profit from mines, blast furnaces and transportation facilities. Instead, said Mr. Wolcott, the schedule was predicated substantially upon costs prevailing among larger companies. Furthermore, it was asserted, in devising and applying its cost formula the OPA improperly excluded from consideration several important cost items.

"It refused to accept the market price as a cost for materials in regard to the integrated companies, and utilized only the cost of raw materials. Since the great majority of carbon steel producers must purchase their raw materials at market prices, the effect of this exclusion was to penalize them arbitrarily and discriminatorily," the protest stated.

Also improperly excluded, according to the statement, were the excess of amortization of war emergency facilities over normal depreciation, and the increased wage cost bound to result from the War Labor Board's order to eliminate intra-plant wage inequities which, when determined, will be retroactive to January 1944.

"Unless they are assured of a fair and reasonable profit on such sales they cannot endure."

"The companies filing this protest are not marginal fringe producers," the protest stated. "They are normally successful companies, earning at a rate normally representative of the industry. The precarious position in which they now stand is due to OPA pricing policies and methods."

Canada Selling Crown Lancaster Factory To Hawker-Siddeley

Toronto

• • • C. D. Howe, Minister of Munitions and Supply, announced the sale, subject to certain conditions, of the government owned Victory Aircraft Co. Ltd., Malton, Ont., manufacturers of the Canadian Lancaster Bombers, to the Hawker-Siddeley Aircraft Co. of London, England.

The sale was the result of a visit to Canada by Sir Roy H. Dobson, C.B.E., a director of the Hawker-Siddeley Co., and also managing director of A. V. Roe & Co., Ltd.

A Canadian company is being formed to operate the Malton plant and no interruption in its operations is anticipated.

One of the conditions of the purchase by the English company covers the establishment in Canada of a design, research and development organization to promote the basic design and manufacture in Canada of all kinds of commercial and military aircraft, turbines for aircraft and other purposes, and various auxiliary equipment in which the company specializes.

The Malton plant of Victory Aircraft Co., Ltd., was established in 1938 by the National Steel Car Corp. when that company was given a contract to manufacture Lysander army co-operation planes for the Department of National Defense. The original plant occupied a floor area of 60,000 square feet, but in subsequent years was expanded until now the plant occupies a total of approximately 1,200,000 square feet.

On November 5, 1943, the plant was turned over to the government and the Crown company, Victory Aircraft Ltd., was formed to operate it.

Under the management of the National Steel Car Corp., the plant produced 225 Lysanders of the Mk. 11 and Mk. 111 types; 80 Hampden bomber wing sections; assembled 119 Yales, 26 Harvards, and 17 British type Ansons; produced 736 Canadian Ansons and 100 Anson fuselages, and was just started on the Lancaster production when its was taken over by the government. Since then to the end of June, 1945, the company has devoted its manufacturing facilities exclusively to the production of Lancasters, and has turned out a total of 398. At present the company is retooling for the production of the new Lincoln bomber, an enlarged and modified version of the Lancaster.

At the height of its Lancaster production program, the company employed nearly 10,000 persons.

LANDING MAT: *A new application of the steel landing mat, developed by Carnegie-Illinois Steel Co. and Army Engineers, is this retaining wall for a staging area in the Pacific. By the end of this year over ¾ billion sq. ft. will have been produced.*

Sheet Production Lag Dims Civilian Prospects, WPB Says

Washington

• • • Prospects are that insufficient quantities of fourth quarter steel sheet and strip will be available on an unrated basis to meet reconversion needs, WPB officials told members of the Iron and Steel Industry Advisory Committee Aug. 2. The opinion was also expressed that unless a decided increase in production of flat rolled products was soon forthcoming, the industry would not be in a position to equal estimated third quarter production.

Definite decision had been made to continue the Controlled Materials Plan throughout the fourth quarter (IRON AGE, Aug. 2, 1945, Page No. 78), WPB officials said, although pointing out that relaxation of controls would otherwise continue unabated.

In order to meet fourth quarter unrated sheet and strip demand estimated at over 1,100,000 tons, WPB said that a production increase of around 400,000 tons will be necessary. This increase, which would bring estimated fourth quarter total production to around 4,000,000 tons, when coupled with decreases in military and programmed B product requirements amounting to 1,000,000 tons and 700,000 tons, respectively, it was pointed out, should provide sufficient flat rolled products for reconversion users on an unrated basis. Total military and program requirements for the fourth quarter are estimated at 2,700,000 tons of sheet and strip.

However, as a WPB official explained, if the mills do not top estimated third quarter production of 3,800,000 tons of sheet and strip, a number of reconversion producers may have to postpone marketing their products until the first quarter of next year. Based on estimated production, only about 700,000 tons are expected to be available to fill unrated orders in the third quarter, which figure approximates earlier estimates of unrated requirements.

Current production losses were attributed to absenteeism and slowdowns, rather than to inability of sheet and strip mills to secure 2000 additional workers as recommended by WPB early this quarter when the supply situation first took on the aspect of deepest gloom.

The need for more coal production to build up industry stockpiles so as to assure continued maximum production, it was said, may prove to be one of the major bottlenecks threatening war production and reconversion. Some mills were reported to have on hand only a few days' coal supply.

New Rate Ranges Set For Metal-Working Plants in Midwest

Chicago

• • • New stabilized wage rates and rate ranges have been fixed by the Sixth Regional War Labor Board for metal-working industries of nine labor market areas in Illinois, Wisconsin, Minnesota and Indiana superseding those established by the Board last winter.

Rates already established for Minneapolis-St. Paul, Evansville, Ind., Springfield-Decatur, Ill., and Racine-Kenosha, Wis., were reaffirmed without modification, but those previously in effect from Chicago, Fort Wayne, Ind., Michigan City, Ind., Indianapolis and Rockford, Ill., were modified. Modifications were upward in some rates, and downward in others.

The rate structures are not mandatory and are not intended to disturb existing wage structures. Stabilized rates are established to limit the degree to which existing wages may be adjusted with War Labor Board approval, and are used to guide the Board in deciding wage adjustment cases. Increases to these rates may not be made without Board approval. The stabilized rate is the highest rate the Board generally will approve for concerns which pay single flat rates. Similarly, the stabilized range is generally the highest range that the Board will approve for firms paying a range of rates for the corresponding job classification.

Stabilized rates are based upon extensive surveys of actual rates paid prior to the national wage stabilization program, according to the Board, and are said to represent sound and tested going rates for the labor market area, industry and key classifications involved.

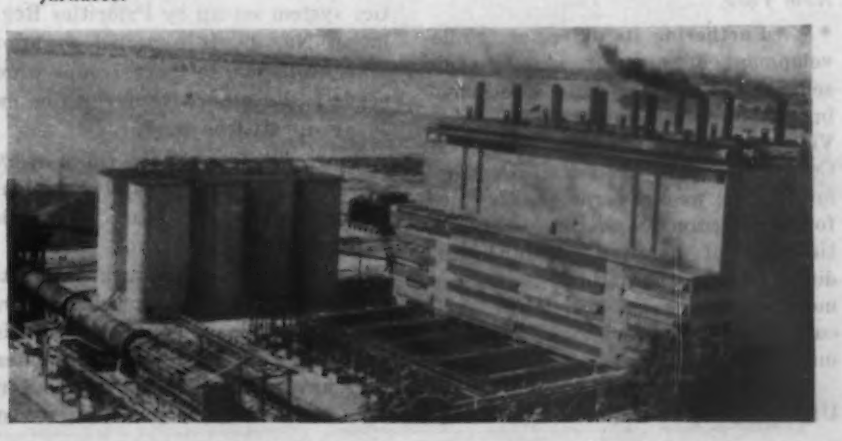
Job classifications affected include assemblers, lathe operators, carpenters, drill press operators, electricians, grinders and grinding machine operators, guards, heat treaters, inspectors, janitors, machinists, maintenance men, mechanics, milling machine operators, millwrights, painters, polishers and buffers, screw machine operators, set-up men, truck drivers, truckers, turret lathe operators, watchmen, welders, and common labor.

Ease Brake Shoe Sequence

Washington

• • • Direction 10 to Priorities Regulation 1, issued last week by WPB, provides that a producer of railroad brake shoes on orders rated AA-1 may distribute his available supply among his customers regardless of the sequence in which rated orders were received. The purpose of the direction, WPB said, is to obtain a fair and equitable distribution.

JET NICKEL: *Of increasing importance to the American aircraft production program is the 27,500,000 lbs. of nickel produced at this plant of the Nicaro Nickel Co. in Cuba. The plant at the right houses 16-hearth oil fired Herreshoff furnaces.*



First Refrigerators To Be Reserved For War Needs Stockpile

Washington

• • • Although WPB has announced that a "secondary ceiling" has been fixed for the production of 1,155,000 domestic mechanical refrigerators in the third and fourth quarters of 1945 and the first quarter of 1946, all of those produced in the third quarter, estimated at 125,000 to 150,000 have become part of the frozen stockpile. They will not be available for retail trade. It was pointed out that this and other industries which use large supplies of sheet steel are being kept under ceilings that will limit their use in the free market. At the same time, however, WPB said that its plans envisage the progressive raising of these ceilings as resources are freed by military cutbacks.

Domestic mechanical refrigerator production for the fourth quarter is estimated at 400,000 to 430,000 and at 500,000 for the first quarter of next year. The quotas have been set regardless of whether the refrigerators are made with or without priorities assistance.

Materials for 265,000 refrigerators were set aside for the third quarter but the output is not expected to exceed 150,000 because 12 of the 13 manufacturers are reconverting from war work in which they have been engaged the past three years. The other producer, the Rohr Aircraft Corp., is a newcomer in the refrigerator field.

In February, 1942, the stockpile was set up with 700,000 refrigerators. It has shrunk to 20,000 units from which WPB must supply the needs of hospitals, laboratories, blood banks and military installations here and abroad. When the supply meets this demand, WPB said, it will be possible to relax the distribution control, but no time can be set for such action, as the problem is so immediately related to the progress of the war.

Controls on Tungsten And Molybdenum Eased

Washington

• • • Revoking M-369 and M-369-a WPB has lifted allocation controls from all molybdenum and tungsten products, except wire. To maintain allocation control on the wire products, WPB issued Direction 6 to the steel order M-21.

Under this direction, processors are required to file a report of estimated monthly production of tungsten and molybdenum wire with the Ferroalloys Branch of the WPB Steel Division.

Radio Series Sponsored By C. E. D. for Job Promotion

New York

• • • Furthering its drive for the development of postwar jobs a radio series over the American Broadcasting Co. network called "Jobs After Victory" will be sponsored by the Committee for Economic Development. The weekly series is scheduled for 52 programs consisting of dramatizations of postwar planning and discussions on the nation's major economic problems by leaders in agriculture, industry, commerce, government, and labor.

Neil Jacoby, vice-president of the University of Chicago and professor of finance, will be moderator of the C. E. D. programs and will be responsible for their production.

Among those who have already agreed to appear are: Fred M. Vinson, Paul G. Hoffman, Eric Johnson, Raymond J. Walsh, Beardsley Ruml, and Walter Fuller.

Pressure Brought For Sub-Military Priority

Washington

• • • As a result of pressure which has been brought to bear by certain groups, WPB is expected to establish a reconversion rating for war supporting and essential civilian activities. This rating, which will be junior to the MM (Must Military) band now provided for in the simplified priorities system set up by Priorities Regulation No. 29, is expected to afford some protection to those groups whose needs would otherwise have to be met on an unrated basis.

Representatives of the Office of Defense Transportation and Petroleum Administration for War, it is said, have come out in favor of such a junior rating. Agricultural interests, particularly the food producing and processing industries under the jurisdiction of the War Food Administration, have requested WPB to afford them some form of priorities assistance after the present AA rating pattern is done away with.

Several agencies concerned with the distribution of goods and materials abroad reportedly have expressed their approval of the expected sub-military rating.

Small business has been outspoken in favoring its establishment.

Conversion Ruling Revised

Washington

• • • Designed to encourage maximum production of sheet and strip steel, WPB on Aug. 2 amended Direction 71 to CMP Regulation 1 to provide that in the case of allocation of steel for conversion into carbon and electrical sheet and strip, allocations may, where necessary, be made to cover the total order book pattern of the producer, including orders with symbol Z-3 and unrated orders. Originally, Direction 71, which outlines how producers can obtain steel for further conversion, provided that allocations of conversion material would be made only to meet the requirements of authorized controlled material orders carrying a symbol other than Z-3.

Krug Denies He Will Quit

Washington

• • • WPB Chairman J. A. Krug has reportedly told his staff that he plans to continue in his present job and flatly denied rumors that he would resign to accept another position either in government or private industry. This apparently culminates a long string of speculative guesses that Mr. Krug would leave WPB to take over as Secretary of the Interior upon the long expected resignation of Harold L. Ickes or, as another rumor had it, to accept a lucrative berth with one of the larger airlines.

Plan Mansfield Expansion

Cleveland

• • • A $6,500,000 expansion program, gaged to meet production 50 pct higher than prewar levels, at the Mansfield, Ohio, electric appliance division plant of the Westinghouse Electric Corp., has been announced by A. W. Robertson, president.

New buildings and additions to existing buildings, which will provide an additional 400,000 sq ft of floor space, will cost $2,153,000. Plant rearrangements, including the cost of machine tools, conveyors, test stands, jigs and fixtures, will total $1,300,000.

Ruhr Steel Mills Fall Into British Occupation Zone

New York

• • • **The German steel industry centered about the coal fields of Rhenish-Westphalia, commonly known here as the Ruhr, seems definitely to be destined for British control during the period of military occupation of Germany. On the other hand, the mills of Silesia, centered about the coal fields in that district, are in the Russian occupation zone, and those in the Saar Basin appear to be destined for American control.**

Matching the general confusion in planning for the tri-partite occupation is the lack of a general policy among the big three on the operation of German industry. While the powers seem superficially to favor a radical de-industrialization of the country, there will certainly be modifications to this policy. For example, the Russians are apparently operating the Silesian mills as near capacity as possible,

GERMAN STEEL: ***The lines of division for the various occupation zones are still not clearly defined following the announcements of the Potsdam conference, but it seems definite that the British zone will include most of the Ruhr industry Reparations, presumably much of it capital goods, will go 50 pct to Russia and 50 pct to all other nations.***

while stripping plants near Berlin of all usable machinery of any kind.

Decisions reached at the potsdam conference have agreed "in principle" to the removal of certain equipment now in the Eastern occupation zones, to the amount of 5 pct of the total reparations to be exacted from Germany. This figure may possibly include certain steel works which Russia wants.

At the same time the American control mission is thinking in terms of a German industry reduced to 2 million tons annual capacity, while London sources are quoted as favoring a ten-million ton industry. The lack of a coordinated policy for German industry as a whole is having dire effects on the occupation, and will have on the future of the country. Correspondents are already reporting damage to plants by occupying American troops.

The German steel industry is no longer using domestic ore, but is centered about three principal coal producing regions divided about as follows, according to the lines of demarcation laid down by the unilateral Russian announcement and unofficial western power sources:

1. About 65 pct of German ingot production, located in the Ruhr, to British control.

2. About 15 pct, mostly in Silesia, to Russian control.

3. Most of the remainder, with the largest mills centered in the Saar, under American control.

The Ruhr district is an area about 40 miles long by 20 miles wide in the Rhine and Rhur River valleys. This area reaches from Duisburg to Dortmund and is underlaid with coal fields containing for the most part coal of good coking quality. Principal producers in this area are:

	Location	Production Net Tons
Friedrich Krupp A.G.	Rheinhausen Essen	1,200,000 500,000
Mannesmannrohrenwerke, A.G.	Huckingen	1,250,000
Klocknerwerke, A.G.	Dusseldorf	1,375,000
Hoesch, A.G.	Dortmund	890,000
Gutehoffnungshutte Oberhausen, A.G.	Oberhausen	862,000
Vereinigte Stahlwerke, A.G.		
August Thyssenhutte, A.G.	Duisburg	3,500,000
Dortmund Hoerder Huttenverein	Dortmund	1,664,000
Bochumer Verein fur Guss, A.G.	Bochum	842,000
Ruhrstahl, A.G.	Hattingen	628,000
Deutsche Edelstahlwerke, A.G.	Krefeld	230,000
Deutsche Eisenwerke, A.G.	Mulheim	205,000
All other Ruhr companies	.....	1,772,000

GOERING WORKS: *No expense was spared in the bessemer shop or elsewhere in the Hermann Goering works located at Salzgitter. Considered by experts to be the most ideally equipped steel works in Europe, the works are the center of interest in the future of German steel.*

About 80 pct of Germany's total steel production, that is about 22,000,000 ingot tons, is concentrated into nine large integrated trusts or combines of which Vereinigte Stahlwerke, A.G., with main offices at Dusseldorf, is the largest. The next largest combine is Reichswerke Hermann Goering, A.G., and other large combinations are Friedrich Krupp, A.G., Klocknerwerke, A.G., Gutehoffnungswerke, A.G., Hoesch, A. Hutte, and Mannesmannrohenwerke, A.G.

In the Saar area, a triangular section not more than 20 miles long and bordered by the towns of Neunkirchen, Saarbrucken, and Dillingen, the principal plant is the Neunkircher Eisenwerke, A.G., at Neunkirchen. This plant is under the control of the Otto Wolf group, having offices in Cologne. Production is on the order of 744,000 net ingot tons yearly.

In the central area of Germany, the most modern plant is that of Reichswerke Hermann Goering, A.G., at Salzgitter in the British zone (near Brunswick), with a production of the order of 925,000 tons. All other plants in this area, particularly the Mitteldeutsche Stahlwerke at Riesa and Brandenburg, the Ilsederhutte, A.G., at Peine, account for some 3,560,000 tons.

The steel production of Silesia centers around Gleiwitz on the Polish border, and totals some 3,100,000 net tons of ingots.

Technically, the administration of the section of prewar Germany nearest to Poland will be administered by the latter nation. This government, at least for the present, however, is a Russian sponsored group, and the territory is at present occupied by the Red Army.

The German Protectorate District (several plants in Bohemia and Moravia) has an ingot output of some 1,900,000 tons.

Austria has an ingot output of (several plants) 1,160,000 tons.

Location of the various producing units as described above, does not preclude the possibility that the period of occupation may see certain mills moved bodily, despite the difficulty of moving steel units.

For example, Russian is admittedly desirous of greatly increasing her steel production, and plants near the line of demarcation in central Germany, such as the Goering Works, most modern steel mill in Europe today, or their output of steel may well find its way into Russian hands.

Comparable to the lack of decisions on the fate of heavy industry is the indecision on the operation of transport equipment, and the division of rolling stock. The lines of demarcation being what they are it is essential that to prevent chaos the railroads be put in order to cross freely from one zone to another. This will be necessary since the Russians, while controlling 48 pct of the territory of pre-war Germany, control only 42 pct of the population, but more than half of the food production. On the other hand Britain, France, and the United States control the sources of more than 80 pct of the good quality coal.

Financial Reports Show Continued Favorable Trend

Steel Earnings Rise For Second Quarter

• • • **Youngstown Sheet & Tube Co.** announced earnings of $3,190,260 for the second quarter of 1945, an increase of $392,243 over the profits for the corresponding period a year ago. Consolidated income statement for Sheet & Tube and subsidiary companies for the second quarter shows net sales and revenues, less cost of sales and other expenses, of $10,690,082.

National Steel Corp. reported net earnings after all charges, including provision for depreciation and depletion, interest charges and Federal taxes, for the quarter ending June 30, 1945, of $3,453,183, equal to $1.56 per share on 2,206,492 shares. This compares with net earnings of $2,863,315, equal to $1.30 per share, reported in the second quarter of 1944.

Net income for the six months ending June 30, 1945, was $6,883,171, amounting to $3.12 per share, compared with $5,413,458, equal to $2.45 per share, for the first half of 1944.

American Rolling Mill Co. earnings were $2,071,925 in the second quarter of 1945, after provision for income and excess profits taxes. This is equal to 54c. a common share. For the same quarter in 1944 Armco earned $1,212,456, or 25c. a common share. Consolidated earnings for the first six months were $3,947,428 or $1.02 a common share compared with consolidated earnings of $2,441,491 in the first six months of 1944.

Pittsburgh Steel Co. reported for the quarter ended June 30, 1945, net profit of $429,741, equivalent to 42c. a share on 508,917 shares of common stock after provision for dividends for the period on the three classes of preferred stock. This compared with net profit of $192,718, equivalent to $1.16 a share on the Class A 5 pct preferred stock in the preceding quarter and with a net loss of $187,840 in the corresponding quarter of 1944.

Net profit for the first six months of 1945 was $622,459, equivalent to 37c. a share on the common stock and comparing with a net loss of $72,901 in the corresponding period of 1944.

Net earnings of the Midland Steel Products Co. for the second quarter of 1945 amounted to $383,015 after all charges including provision for federal taxes on income and for general contingencies. This compares with net earnings of $381,851 for the corresponding quarter of 1944.

After deducting quarterly dividend requirements of $2.00 per share on the eight pct cumulative first preferred stock and 50c. per share on the $2.00 non-cumulative dividend shares, the remainder is equivalent to 70.3c. per share on the common stock. This compares with 69.8c. per share for the same quarter in 1944.

Net earnings for the first six months of 1945 were $760,611, which after deduction of preferred dividend requirements is equivalent to $1.3839 per share on the common stock. This compares with $1.3505 per share for the same period of 1944.

Net sales of Lukens Steel Co. and subsidiaries for the first three quarters, ended June 16, 1945, of their present fiscal year, amounted to $33,233,994.95.

Unaudited net income from operations for this same period amounted to $40,968.01, after provision for Federal and State taxes. This does not, however, include the estimated Federal Tax recovery due to carryback provisions of the Internal Revenue Act amounting to $366,600.00, which results in a total net income of $407,568.01 from all sources.

For the first three quarters of the previous fiscal year, net sales of Lukens and subsidiaries were $36,664,462.39, with a net income of $654,033.13, after Federal and State taxes.

Directors of the M. A. Hanna Co. this week declared a dividend of 35c. a share on common stock, payable September 13 to stockholders of record September 1, and the regular quarterly dividend of $1.0625 a share on $4.25 preferred stock, payable September 1 to stockholders of record August 15. The 35c. common dividend and the two 25c. dividends previously paid this year follow the same schedule of payments as in the last few years.

Interlake Iron Corp. has reported income for the three months ended June 30 at $42,524, equivalent to 2c. a share, compared with $246,535, or 13c. a share, in the second quarter of 1944. Provision for estimated federal income taxes for the latest period was $52,000 against $309,000 a year ago. Total provision for depreciation and amortization was $669,269.

AUSTRALIAN STEEL: *Works of the Broken Hill Pty. Co., Ltd. B. H. P. and industries within its control cover most of the southern continent. The company was established in* 1915.

Inventories of Government-Owned Machine Tools and Production Equipment Compiled by RFC Pursuant to SPB Reg. 6

	RFC		ARMY		NAVY**		MARITIME COMMISSION	
	MT	OPE*	MT	OPE*	MT	OPE*	MT	OPE*
In Government owned plants	174,100	256,700	Not reported		63,800	33,600	Not reported	
In privately owned plants	73,600	64,700	54,800	16,300			276	2,169
Total	247,700	321,400	54,800	16,300	63,800	33,600	276	2,169

SUMMARY

	MT	OPE
RFC	247,700	321,400
ARMY	54,800	16,300
NAVY	63,800	33,600
MARITIME	276	2,169
Totals	366,576	373,469

* Other production equipment. Includes general purpose industrial machinery and equipment, electrical machinery and apparatus, special industry machinery, metalworking machinery other than machine tools.

** Not including items in Navy Shore Establishments.

Surplus Witnesses Conflict On Desirability Of Central Inventory

BY EUGENE HARDY

Washington

• • • **In the midst** of revived congressional demands for a centralized inventory of surplus property, the Surplus War Property Subcommittee of the Senate Small Business Committee has opened hearings on the administration of the Surplus Property Act.

Inadequacy of inventories maintained by disposal agencies was emphasized by Sen. Tom Stewart, Democrat of Tennessee, who criticized a Reconstruction Finance Corp. inventory as being too general in setting forth specifications of surplus machine tools offered for sale by that agency.

When informed that RFC had not established a centralized inventory because of high administrative costs Senator Stewart commented, "I can't see why it wouldn't pay to spend $1 million to keep track of $100 billion worth of surplus property." He later offered to get sufficient space to house the undertaking if RFC found its quarters too crowded.

Actually, RFC does maintain detailed inventories at their regional offices, where the sales are made, but not at headquarters in Washington, as thought desirable by Senator Stewart.

E. Richard Bagarozy, Pressurelube, Inc., and representatives of the Smaller War Plants Corp. opened the testimony in favor of a centralized inventory. SWPC officials promised the committee that they would report at a later date on the degree of success attained by 300 small businessmen who contacted SWPC during July for help in obtaining surplus machine tools.

Walter E. Joyce, Assistant Director of RFC's Office of Surplus Property, opposed a centralized inventory and attempted to outline the method used by RFC in selling surplus tools by means of actual illustrations.

For example, the Studebaker Chicago plant was declared surplus during the week of July 16 and 4000 surplus tools will be offered for sale by RFC at their present locations in the plant. This sale has the approval of the Surplus Property Board, accord-

ing to Mr. Joyce. It is expected that these tools will be sold within 30 days after the original announcement. Detailed inventories, as suggested by Senator Stewart, are available at the plant site for inspection. Mr. Joyce pointed out that sales are generally handled in this manner so as to minimize storage and transportation problems.

Large war contractors will not purchase more than 15 pct of the government-owned machine tools in their plants, while it is expected that smaller manufacturers will purchase a much larger proportion, said Mr. Joyce.

The Committee criticized sales of government-owned machine tools to contractors in possession, citing a proposed sale to General Motors, before these tools are offered to the general public.

Prefacing all his remarks by urging the need for speed in disposing of excess machine tools, Mr. Joyce told the Committee that tools similar to those in G.M. plants have previously been offered for public sale.

SPB officials later told Senator Stewart that if machine tools were going to be used in continuing war work they can not be declared surplus but can be sold to the contractor in possession, as is the case with the prospective sale to G.M.

The latest inventory of RFC machine tools and metal working machinery, reproduced here, was presented to the committee by Mr. Joyce, who said that this listing was in accordance with SPB Regulation 6, as is the listing of Army, Navy, Maritime Commission and RFC tools, also shown here.

Mr. Joyce strongly emphasized that these listings show all government-owned tools and not surplus tools. Detailed inventories are not made available at the regional offices until the tools are actually declared surplus.

Mr. Joyce also told the committee that 7506 tools were declared surplus in June and that RFC had disposed of about 12,000 to date.

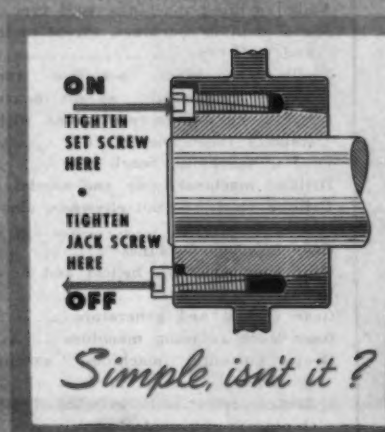
W. Stuart Symington, SPB Chairman in a short statement told Senator Stewart that he knew the Senator would not be happy until he got the detailed inventory and that he would see what could be done. However, Mr. Symington also pointed out the difficulties in assembling and keeping such an inventory up to date.

With the exception of SWPC officials and the lone industry representative all witnesses seemed to think that such an inventory taking up

- Here is the simplest, surest mechanism ever devised for holding wheels to shafts! No flange. No collar. No protruding parts.
- The Taperlock Sheave mounts as a complete unit. Slip it on, line it up and tighten *while sighting.* It's in place on the first try!
- The bushing is wedged into the sheave by means of set screws—with a firmness equivalent to a shrunk-on fit—whether the shaft is standard or normally undersize.
- The Taperlock runs *true.* The bushing extends the entire length of the hub; it provides a *full* bearing surface.
- Close mountings are made possible. No flange nor collar nor other device is required at either end of the sheave hub.
- The Taperlock "unlocks" with less effort than any other sheave—due to its special taper.
- Taperlock Sheaves will be available in all stock sizes. For details call your local Dodge Transmissioneer. You'll find his name listed under "Power Transmission Equipment" in your classified phone book . . Or write Dodge, Mishawaka.

SIGN OF THE DODGE TRANSMISSIONEER

There are 257 Dodge factory graduate Transmissioneers, located in principal cities, to show you NEW and BETTER ways of transmitting power.



Simple, isn't it?

ADVANCED DESIGN IN POWER DRIVES

space in Washington would be constantly outdated and of no particular value. There was consistent agreement that detailed inventories at the regional offices and sale sites were necessary.

Description	Quantity
Horizontal boring, drilling and milling machines	1569
Vertical boring and turning mills, including vertical turret lathes	2317
Precision boring machines	4176
Jig boring and grinding machines	678
Miscellaneous boring machines	522
Internal broaching machines	653
Surface broaching machines	187
Combination external and internal broaching machines	89
Broaching machines, not elsewhere classified	75
Deep hole drilling machines, all sizes (include rifle drilling machines and rifle drilling and reaming machs.)	782
Radial drilling machines, plain	5305
Radial drilling machines, wall type	70
Radial drilling machines, except plain and wall type	1117
Drilling machines, sensitive and power fed upright, except bench type (one and more columns with spindles independently fed)	23,094
Drilling machines, bench type	7089
Drilling machines, way and special	4229
Drilling machines, not elsewhere classified	3610
Gear hobbing machines	2177
Gear shapers (spur, helical and herringbone)	2844
Gear cutters and generators	1147
Gear tooth grinding machines	2375
Gear finishing machines, except grinders	1224
External cylindrical grinding machines, except centerless	10,372
External cylindrical, centerless	1931
Internal cylindrical grinding machines	9241
Surface grinding machines	9374
Thread grinding machines	2545
Special tool and cutter grinding machines	8579
Universal tool and cutter grinders	3997
Disc, face and stand grinders	12,250
Grinding machines, miscellaneous (do not include abrasive cut-off machines)	6134
Lathes, engine and tool room	13,400
Bench type and light duty (less than 1 hp.) lathes (include bench turret lathes and bench hand screw machs.)	4710
Turret lathes, ram type (include hand screw machines except bench type)	9194
Turret lathes, saddle type	5785
Automatic chucking and between centers lathes	5463
Automatic screw machines, single-spindle (bar)	2788
Automatic screw machines, multi-spindle (bar)	2963
Artillery, ammunition and boring lathes	482
Lathes, not elsewhere classified	2924
Milling machines, bed type	6549
Milling machines, knee type, horizontal	6397
Milling machines, knee type, vertical	3743
Milling machines, universal head and ram type	1070

Now! an IMPROVED KENNAMETAL LATHE FILE

- *CUTS STEEL NO ORDINARY FILE CAN TOUCH*
- *PERMITS FILING SPEEDS 3 TO 10 TIMES THOSE POSSIBLE WITH STEEL FILES!*
- *OUTLASTS MILL CUT FILES 50 TO 200 TIMES*

This new Kennametal Lathe File retains all the time- and cost-saving characteristics of previous designs — ***cuts steel up to 62 Rockwell C hardness; does outstanding job on cast iron and non-ferrous materials; permits filing operations at carbide tool turning speeds; produces superior finish.***

And now, in addition, it provides these new features — ***longer filing surface; quick, easy blade replacement; greater handling convenience.***

The filing surface comprises two 4" long Kennametal blanks which have cylindrical nuts brazed to them, and are attached to the aluminum alloy handle by screws. After long service (up to 200 times that obtained from steel files) the blanks can be readily replaced.

The handle grip has a thumb rest and knuckle guard. An extension of the handle beyond the filing surface provides a secure finger hold. A hole in this extension permits the file to be hung up.

On the first production run, a Kennametal Lathe File usually saves its cost many times over. Order one—let it demonstrate to you an astonishingly low filing cost-per-piece.

Features

REPLACEABLE BLANKS

Kennametal blanks are attached by Phillips head screws. Two types are available: fine (30 teeth per inch); and coarse (20 teeth per inch).

LIGHT WEIGHT

Weighs less than one lb. Can be handled with ease, and used for long periods of time with minimum expenditure of energy.

HAND-FITTING GRIP

Handle is comfortable—it fits the hand; provides secure grip. Opposite end of file provides convenient finger hold.

SPECIFICATIONS AND PRICES

COMPLETE FILE		FILE BLANK—2 REQUIRED		
CAT. No.	PRICE EACH	CAT. No.	TEETH/ INCH	PRICE EACH
F-45*	$18.50	F-453	30	$7.50
		F-452	20	7.50

*** Furnished with blanks having 30 teeth/inch unless otherwise specified.**

KENNAMETAL

SUPERIOR CEMENTED CARBIDES

KENNAMETAL Inc., LATROBE, PA.

Description	Quantity
Milling machines, thread (thread hobbers)	1603
Milling machines, bench and hand	1852
Profilers and contour; die sinkers; duplicators; cam and engraving millers	3060
Milling machines, planer type	198
Miscellaneous milling machines	3236
Planers, double housing (include convertible)	298
Planers, open side	151
Crank planers and shaper planers	220
Plate planers	33
Planers, miscellaneous	215
Shapers and slotters, except gear shapers	2466
Keyseating machines	145
Honing and lapping machines, except gear honing & lapping	4115
Polishing and buffing machines	9244
Cut-off and sawing; contour sawing and filing machines	8810
Tapping and threading machines	4154
Centering machines (all types and sizes)	541
Machine tools, not elsewhere classified	12,119

Total Machine Tools, 247729

•

Rolling mills and Allied Equipment

Semi-finishing mills	46
Finishing mills for flat-rolled products	66
Finishing mills except for flat-rolled products	43

Drawing Machines

Wire-drawing machines	416
Draw benches	320

Primary Metal Forming Machines and Equipment Not Elsewhere Classified

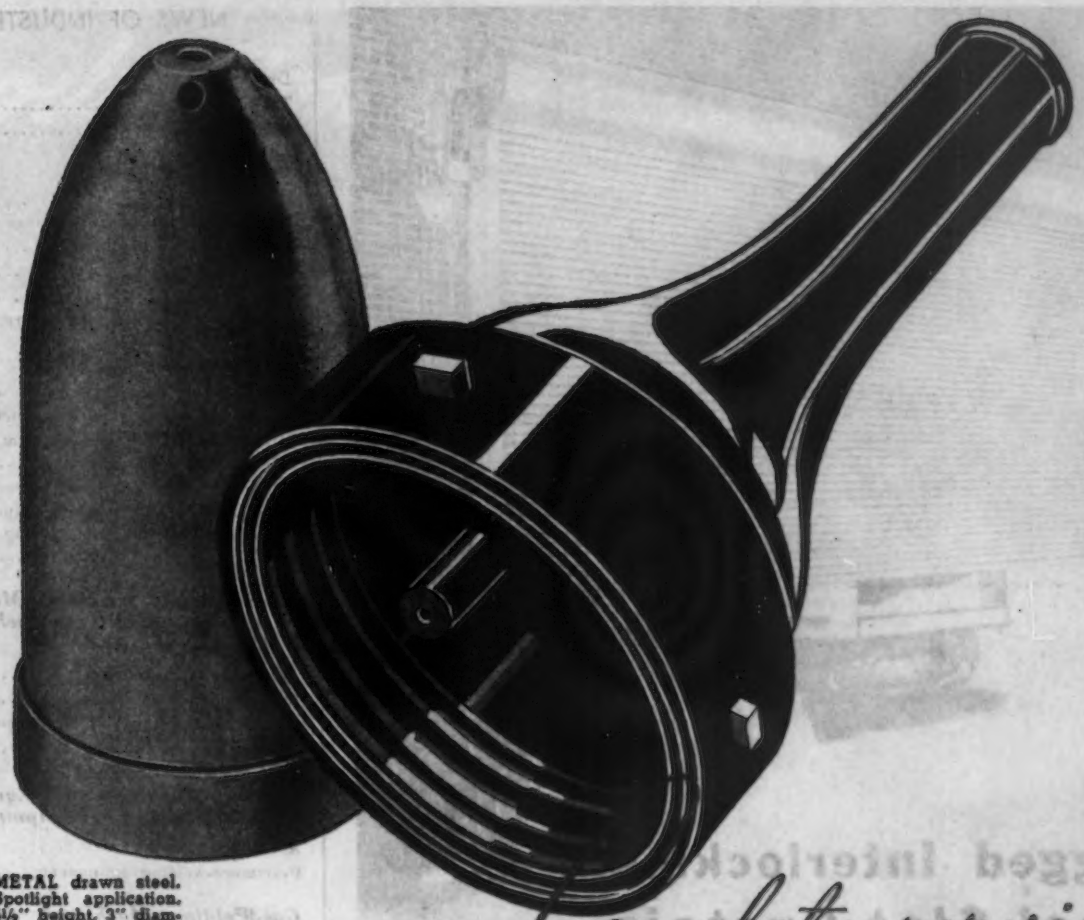
Bending machines, plate and sheet roll bending	391
Bending machines, plate and sheet roll levelers (straightening)	128
Bending machines, plate and sheet-press and apron brakes	1062
Bending machines, plate and sheet forming rolls	883
Shape, bar, pipe, and tube bending machines (roll type and bending head type)	840
Bending machines, pipe and tube flanging and expanding rolls	327
Bending machines—press type	141

Hydraulic Presses

Vertical—forming or drawing	923
Vertical—general utility	1388
Vertical—forging (self-contained)	89
Vertical—forging, steam pneumatic	32
Horizontal—wheel, force, arbor	574
Horizontal—piercing, drawing	157
Mechanical presses, 1 point vertical	2185
2 point vertical	219
4 point vertical	28
End wheel vertical	218
Horizontal	91
Inclinable	1115

Shearing and Punching Machines

Alligator shears	362
Rotary disc shears (circle)	129
Rotary slitting shears	264
Square shears	1350
Combination punching and shearing machines (include single operation punching or shearing machines)	738
Double housing multiple punch	128



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America's largest Industries are benefiting by our experience in both Plastic Molding and Metal Stamping. The METAL SPECIALTY CO. offers you this unique service combination. Our alert experienced Engineering and Designing staff keeps abreast of the rapid changes in material and production methods, for both Metal Fabricating and Plastic Molding.

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SALES OFFICE — W. GRAND BLVD., DETROIT, MICH.

NEWS OF INDUSTRY

Description	Quantity
Turret punches	185
Nibbling machines	274
Forging Machinery	
Hammers	3855
Headers and forging machines (upsetters)	195
Rolls	353
Swagers	362
Miscellaneous forging machinery	67
Wire Forming Machines	
Die forming press for paper clips, safety pins, and similar products	66
Stranding, twisting and braiding machines	3744
Winding machines for coiling springs	96
Wire straightening machines (include wire straightening and cutting machines)	278
Miscellaneous Secondary Metal Forming and Cutting Machines and Equipment	
Thread rolling machines	216
Tube reducing machines	69
Shrinking machines (sheet metal)	296
Marking machines	2065
Welding Machinery and Equipment Electric-Welding Equipment	
Arc-welding equipment	9869
Resistance-welding equipment	2782
Gas-Welding Machinery and Equipment (Oxyacetylene, Oxyhydrogen and Related Fuel Gases)	
Acetylene generators	248
Flame cutting machines	644
Thermit welding equipment	21
Testing and Measuring Machines Physical Properties Testing Machines	
Hardness testing machines	4326
Pressure testing machines (hydraulic)	536
Spring testing and checking machines	200
Strength of material testing machines	824
Miscellaneous physical properties testing machines	1839
Machines for Testing Structure & Composition of Metals	
Fluorescent penetrating inspection machines	276
Magnetic inspection machines	1554
X-ray machines	369
Balancing Machines	
Static	294
Dynamic	265
Combination static and dynamic	216
Inspection Testing and Measuring Machines	
Comparators	4827
Gear measuring and testing machines	1387
Hob, worm and cutter measuring machines	118
Miscellaneous Testing and Measuring Machines Not Elsewhere Classified	
Graduating machines (dividing)	10,865
Heat Treating Furnaces and Devices	
Electric	4242

Electroplating and Anodizing Equipment

Electroplating machines	1489

Riveting Machines

Helve hammer type	3641
Rotary vibrating type	324
Spinning type	128
Squeeze type	10,198

Metal Heating Furnaces and Devices

Induction-heating devices	247
Metal spraying equipment	1461

TOTAL, 337682

ICC Rate Decision Affects Midwestern Rail Steel Loading

Washington

• • • **Covering 10 related proceedings, the Interstate Commerce Commission recently handed down a voluminous decision passing on carload rates on iron and steel products in official classification and western line trunk territories and turned thumbs down on the rates in four cases.**

It found to be unreasonable rates from certain points in western truck line and official classification territory to certain destinations in Minnesota, Nebraska, North Dakota, Iowa and Wisconsin. Among points of origin are Chicago, Kansas City and Peoria, Ill., and destinations include such cities as St. Paul, Minneapolis and Duluth, Minn., and intermediate points. The Commission ordered the carriers to reduce rates from the existing 32.5 pct to 28 pct of the first class rate prescribed in the Western Trunk Line Class Rate Case.

On the other hand suspended rates from Chicago and Peoria, St. Louis and Kansas City to the Twin-Cities, Duluth, and intermediate points in Minnesota, Upper Michigan, Wisconsin, Iowa and Missouri were found not to be reasonable or just. The Commission ordered that these rates be increased to the same percentage scale as those applying from Kokomo and Indianapolis, Ind., to the same destination.

A like order was issued with respect to rates from Chicago, Peoria, Milwaukee and St. Louis to points in Nebraska, North Dakota and South Dakota.

Rates within official classification territory were found not to be unreasonable. Rates from Duluth to Sioux City, Iowa, and to destinations in Nebraska and South Dakota in re-

Use-tested in more than 70 of the Nation's leading forge shops, Barium Steel's Die Blocks have proved their ability to "stand the gaff" longer and better.

Ten to twenty-eight percent more forgings per sinking are reported by users who continue to back up their enthusiastic acceptance with repeat orders.

The *extra* toughness of Barium Die Blocks is the direct result of Barium Unified Control . . . the teamwork of experienced metallurgists, engineers, production men and craftsmen.

BARIUM UNIFIED CONTROL guards the metal's progress from raw material to a finished product of an analysis that meets specifications exactly. The inevitable result is a die steel of *correct grain structure* and of the *required hardness.*

* * *

Barium Hammer Piston Rods are worthy companions of the die blocks. Also made under Barium Unified Control, they have registered remarkable records of durability.

* * *

If you have a *tough* problem in heavy steel forging —put it in a blueprint and send it to Barium. Your inquiries are welcome.

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CANTON 1, OHIO

Producers and Forgers of Carbon, Alloy and Stainless Steels

lation to rates from Duluth to the Twin Cities were found not to be unduly prejudicial and preferential.

The Commission also said that the non-establishment of alternative basis of rates subject to carload minima of 60,000 lb. and 80,000 lb. was not unreasonable.

Complaints in the various cases included state regulatory bodies and Chambers of Commerce. Among interveners were steel producers and consumers.

CED Survey Indicates Orderly Reconversion For Detroit Center

Detroit

• • • **The Detroit metropolitan area** will take reconversion in stride with a minimum of unemployment and with the probability of establishing new records in commerce and industry immediately its productive power is finally turned from making war to building peacetime prosperity.

This is the composite opinion of 7000 employers of nearly a million men and women in Wayne, Oakland and Macomb Counties. Their best judgment as to the facts and the probabilities has been compiled by the Committee for Economic Development in a postwar employment survey.

While the future seems bright it is not without serious problems, and analysis of the CED survey reveals. Its directors are particularly anxious that it not be interpreted as an invitation to flood the Michigan labor market. Because of the tremendous labor supply attracted by war production and because work must be found for some 200,000 returning veterans who belong to Wayne, Oakland and Macomb Counties, it seems unlikely that there will be a job to spare.

The CED survey was started in April with the distribution of a questionnaire and with the aid of the Detroit Board of Commerce, the Michigan Planning Commission, the School of Business Administration of the University of Michgan and the Michigan Unemployment Compensation Commission. The survey includes all employers of eight or more persons in the Metropolitan Area, subject to unemployment compensation. Replies have been received from 7000 out of 7800 inquiries sent out.

Approximately 704,000 persons were employed by the 7800 firms in the three-county area in April 1940. In April of this year, under the impetus

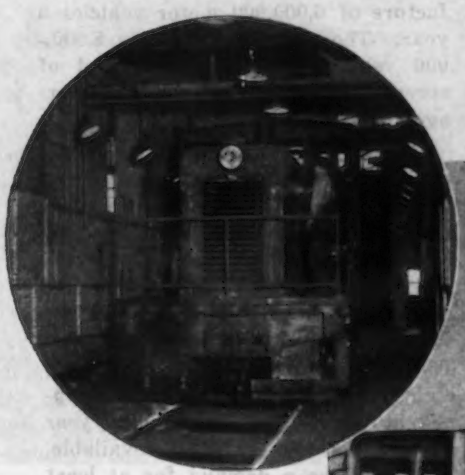
It Takes Real Pull to WIN A WAR!

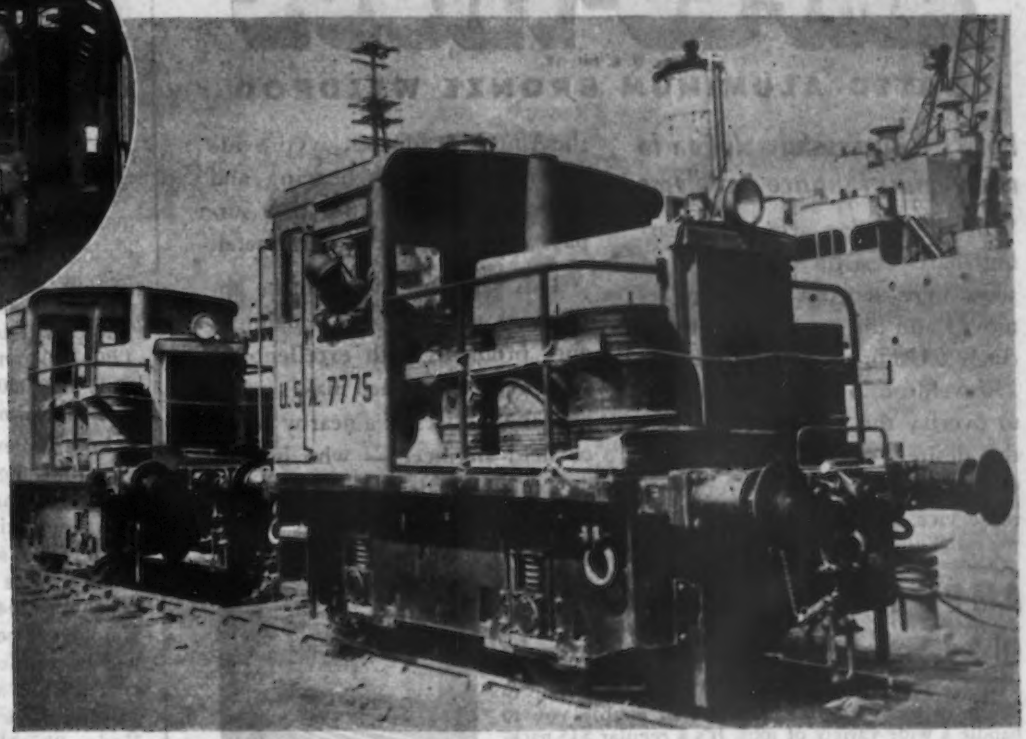
TO GET fighting men and equipment *where* they are needed *when* they are needed is a job that requires real pull. And for an important part of this pull to win, America and its allies have learned to depend on the mightiest mites on rails—Diesel-electric locomotives built in the U. S. A. Wherever this war of movement has taken them, Diesels of all types have "sweated out" their passage money many, many times over.

Makers of these Diesel-electrics can be proud of their battle records. And we of DeVilbiss are proud that leading producers depend on the speed and efficiency of DeVilbiss Spray Painting Equipment to give their locomotives the tough protective finishes they require.

Locomotive builders will continue the use of their present DeVilbiss Spray Equipment installations after the war. But countless other companies that must convert to peacetime production will have to revise their finishing operations. If *you* are one of these, consult a DeVilbiss Spray Engineer *now!* From the four DeVilbiss lines—spray painting equipment, exhaust systems, air compressors, hose and connections—he will plan the fastest, most efficient and economical spray system for your product.

THE DeVILBISS COMPANY, TOLEDO 1, OHIO
Canadian Plant: Windsor, Ontario





DE VILBISS
Spray Systems

SPRAY EQUIPMENT • EXHAUST SYSTEMS • AIR COMPRESSORS • HOSE & CONNECTIONS

of war production, the number had risen to 953,000.

Replies indicate that 668,000 persons will be employed during the period of reconversion, that 911,000 will be employed when reconversion is completed and that 1,083,000 can be employed under "highly prosperous business conditions."

It is estimated that reconversion, which actually started July 1, 1945, will cover a period of approximately 18 months and that 286,000 persons, 187,000 men and 99,000 women, will be unemployed for some period during that time. The survey indicates that the average time required for reconversion by these 7000 firms will be three and one-half months assuming tools and materials are available.

Taking the automotive industry as an index, the CED survey assumed that "highly prosperous business conditions" would exist with the manufacture of 6,000,000 motor vehicles a year. The previous high was 5,000,000 vehicles and over a period of several years before the war the average was 3,500,000.

CED survey directors have concluded that the manufacture of 6,000,000 cars a year for several years after reconversion has been completed, is no indulgence in undue optimism. They point out that about 4,000,000 automobiles have been scrapped since their manufacture was halted in 1942. Those now operating average over eight years old. They will be scrapped at the rate of 3,000,000 a year as soon as new cars are available. There will be a demand for at least 1,000,000 trucks per year and possibly 200,000 cars a year for export, it was claimed.

It is believed that 6,000,000 cars a year can be sold for a number of years and that the facilities for building them exist.

The CED survey shows that 129,000 women were employed by these 7800 firms in 1940 and 284,000 in 1945. Employers believe that 186,000 women will be employed during the reconversion period and 204,000 thereafter—75,000 more than before the war. Under "highly prosperous" conditions the number would rise to 235,000 or 106,000 more than before the war.

The CED survey indicates that 79,500 persons in the three counties will quit their jobs after the war ends. However, not all of these will be taken out of the labor market. It is estimated that 15,500 men, most of them over age, will retire, that 18,250 women will return to their homes and that 9000 men and 4000 women will

Contact KAYDON *of Muskegon*

FOR ALL TYPES OF BALL AND ROLLER BEARINGS 4" BORE TO 120" OUTSIDE DIAMETER

Bearings That Are Really THIN!

KAYDON Radial Ball Bearings of exceptionally thin cross section; 30.500" I.D. x 32.000" O.D. x .750" wide.

A LARGE manufacturer of war equipment needed bearings so thin that no one but **KAYDON** undertook to make them. But **KAYDON** "came through" and today, these "thinnies" are in use. Some day, their important part in a vital war machine can be revealed.

KAYDON has already built a reputation for tackling difficult assignments — making special types of ball and roller bearings from 4" bore to 120" O. D., thus making it unnecessary to compromise on a "standard" bearing that doesn't exactly fill a need.

Available at **KAYDON** is atmospheric control in heat-treating, rarely provided by special bearing manufacturers. Also, **KAYDON** offers added services in flame hardening, precision heat-treating, metallurgical laboratories, microscopy, and physical testing.

Counsel in confidence with **KAYDON**. Capacity is available and growing for production of all types and sizes of **KAYDON** Bearings. Look ahead — plan ahead — with **KAYDON**!

KAYDON *Types of Standard or Special Bearings:*

Spherical Roller • Taper Roller
Ball Radial • Ball Thrust
Roller Radial • Roller Thrust

KAYDON

THE KAYDON ENGINEERING CORP.

MUSKEGON · MICHIGAN

New in Name . . . Old in Experience

quit and seek work outside Michigan. Approximately 16,000 men and 6300 women will leave present employers to seek other work in the community or go into business for themselves and 7500 men and 3400 women will seek other jobs within the state but outside the metropolitan area.

These figures on personnel losses are only estimates because employers, for obvious reasons, did not canvass employees on the subject.

The three-county area has approximately 300,000 men and women in the armed services. Of these about 75,000 may be retained in the permanent postwar armed forces. It is estimated that about 25,000 of those returning will go to school. This means that jobs must be provided for approximately 200,000 of them.

All of which, it was said, indicates that while employment gives promise of remaining at a high level there will be no surplus jobs in the Detroit area except under tremendously favorable business conditions.

Further processing of the CED survey by the tabulating department of The Detroit Edison Co. is continuing. A detailed booklet will be issued in printed form by the local Committee soon. General information valuable to labor and business in every type of undertaking and industry will be available without violating the confidential returns of the individual employer.

Committee Recommends Use of War Plants To Help Steel Situation

Washington

• • • Charging that protection afforded small business in the reconversion period is inadequate, the Senate Small Business Committee in a report made public July 30 recommended that WPB takes steps to set aside a proportionate share of basic materials for small business in reconversion operations during the period that material upplies are insufficient to meet overall civilian demands.

Industry circles, however, considered as of greater importance the recommendation that the WPB make every effort to bring about prompt reconversion of Government-owned steel plants to manufacture types of steel which are suitable for the production of civilian requirements. Those facilities which are cited in the report as suitable for conversion from military production include the open

PUTTING HEAT-PROOF BRAWN *Into Peels!*

Charging peels, used to introduce scrap metal into open-hearth furnaces, are subject to alternate periods of terrific heat and cooling, causing the charging ends to develop fire cracks. For this "business end" of the peel, a heat-and-wear resistant alloy steel is frequently specified; the remainder of the peel is made of mild steel. Thermit welding is used to join the two parts together.

Thermit welding is the favored welding process for this exacting assignment because the weld must be strong, permanent and stress-free. Thermit welding is readily adaptable for such heavy section jobs—an outstanding example being its use in fabricating stern frames for Liberty ships. It is also used extensively for repairing rolls, pinions, machine frames, crankshafts and other large parts—where the permanency of the weld and the economy of the process are decided advantages.

Thermit welding can be done in your own plant or at one of the Metal & Thermit plants at Jersey City, N. J., Pittsburgh, Chicago or South San Francisco. Write for full details to Metal & Thermit Corporation, 120 Broadway, New York 5, N. Y., Albany, Chicago, Pittsburgh, So. San Francisco, Toronto.

Thermit Welding

hearth furnace and electric furnace plants with mills operated by the Republic Steel Corp. at Chicago; the integrated plant at Geneva, Utah, operated by the Geneva Steel Co. subsidiary of the United States Steel Corp.; the blast furnace operated by the Lone Star Steel Co., Texas, and the Homestead, Pa., plant operated by the Carnegie-Illinois Steel Corp. which includes open hearth works and armor plate facilities.

The committee expressed the opinion that these plants should be converted to the production of sheets as quickly as possible where facilities make that possible in order to provide employment, to increase available quantities of civilian steel and to relieve the already overburdened Eastern mills.

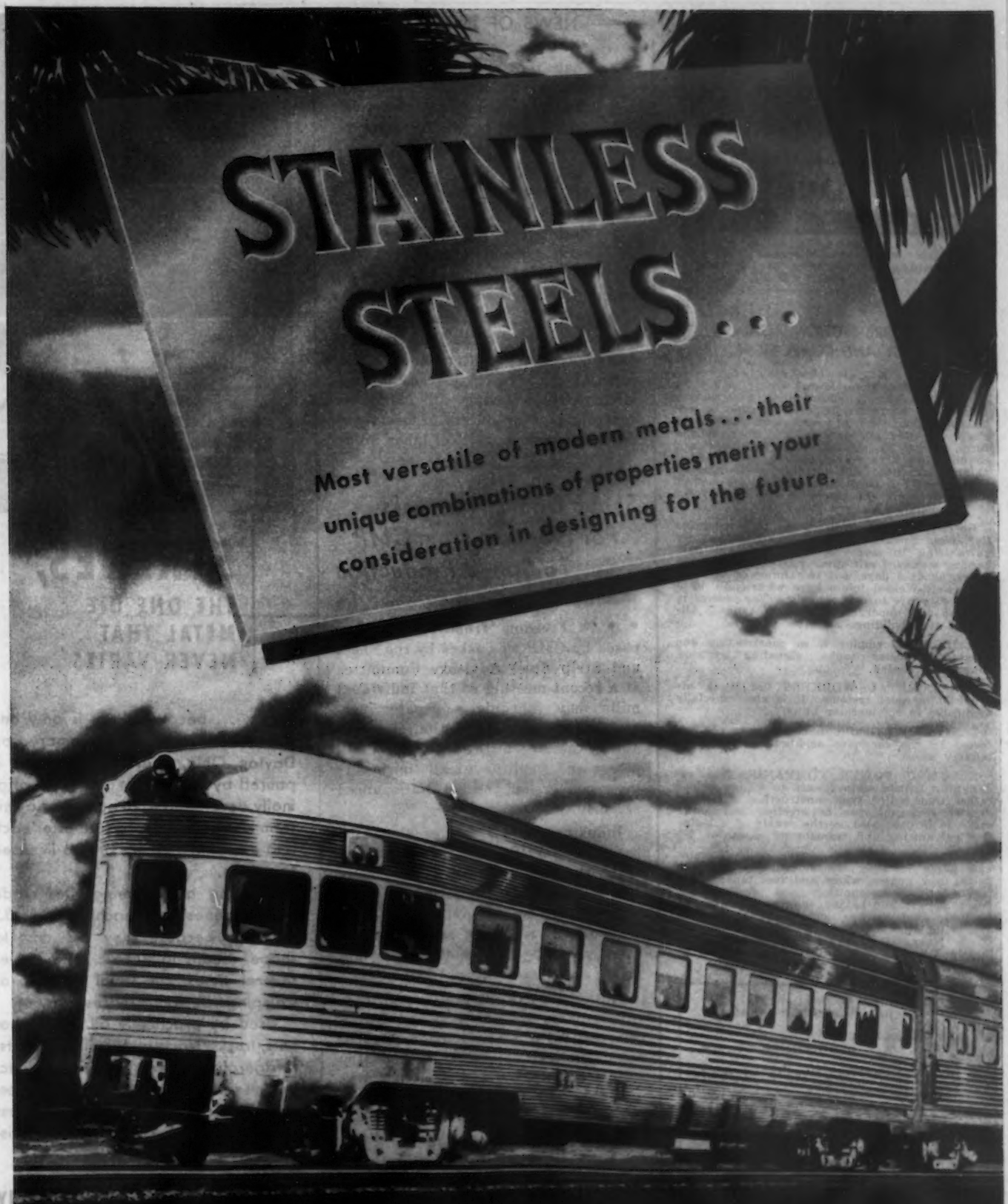
Exception is taken to views expressed by WPB Chairman Krug on the situation confronting small business, particularly with respect to quantities of steel sheet and strip available for third quarter civilian production which, it is said, will be much less than originally estimated. WPB regulations not requiring mills to schedule orders if inclusion on the schedule would result in production loss, even though allotments or preference ratings would ordinarily require them to do so, the committee said, has lessened chances of small concerns securing steel under Z-3 allotment symbols. Many small orders would cause such a production loss, it is said, thus giving larger consumers a better opportunity to secure supplies of available sheet and strip in the third and forth quarters. Due to miscalculations by WPB, the report points out, small concerns will have only a slight chance of securing sheet and strip in the current quarter.

Other recommendations urged by the committee are:

1. That PR 27 and 29 be amended so as to provide preference rating assistance to firms doing less than a stated amount of business each quarter after Oct. 1, 1945.

2. That reconsideration be given to increasing the $50,000 limitation in PR 27 to $100,000 in order to increase the number of firms eligible to use it.

3. That special consideration be given to applying the dollar volume limit on use of PR 27 to a firm's civilian business only in order to assist smaller firms in partial reconversion to civilian production.



● This Streamliner exemplifies the enduring strength and beauty of stainless steel. Characterized by endurance under corrosive conditions, chromium-Nickel stainless steels permit reduction of bulk and dead weight...without sacrifice of strength or safety.

• • •

International Nickel are miners, smelters and refiners of Nickel, an important ingredient of the stainless steels, but do not produce stainless steels. If interested, please communicate with established sources of supply for stainless steels.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 Wall Street New York 5, N.Y.

4. That the statement of policy contained in PR 28 be modified to show that WPB will grant preference rating assistance to smaller firms requiring components to resume civilian production and not only in the very exceptional cases, to which it now applies.

5. That every effort be made to broaden and strengthen WPB inventory control enforcement so to keep preemptive buying at a minimum.

6. That WPB continue to observe manpower controls as they apply to raw materials producers and, in conjunction with WMC, investigate possibility of removing all manpower controls over producers of basic raw materials even in critical labor areas.

Sheet Committee Asks For Freedom from CMP To Speed Production

Washington

• • • Freedom from controls imposed by CMP was asked by the Sheet and Strip Steel Advisory Committee at a recent meeting so that individual mills may schedule a greater percentage of their production thus enabling them to utilize available manpower and facilities at all times during reconversion, the WPB announced recently.

Industry representatives expressed the belief, WPB said, that commencing with operation of the "MM" band under Priorities Regulation 29 more open space would appear on mill schedules by reason of reduced orders once prompt and continuous shipments were assured.

Anticipating a 50 pct drop in carryover from the third to the fourth quarter, WPB Steel Division officials' optimism was dampened by industry reports that the CMP order load was still very heavy. This is indicative of the very gradual improvement which can be expected in the third quarter sheet and strip situation.

Although WPB officials appear to be encouraged by cutbacks in requirements for Army shelters, informed sources say that increases in military needs for sheet and strip in other types will more than sop up any immediate surplus in 16 gage and lighter sheet and strip. Proposed substitution of aluminum for steel in some types of shelters may help the fourth quarter but will be of little avail in the next two months.

Someday, when you need coordinated facilities for stamping, welding, fabricating, machining— think of

POLLAK MANUFACTURING COMPANY.

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DEVELOPING • DESIGNING • MACHINE WORK • SPINNING

GAS AND RESISTANCE WELDING • STAMPING • ELECTRICAL WORK

MACHINE TOOLS

. . . News and Market Activities

Exact Tool Needs Hard To Define

Cleveland

• • • Keyed to a heavy reconversion demand that promises to continue for a little while at least, machine tool builders are finding it difficult to make long range predictions regarding what tools will be most wanted after the present flurry dies a natural death. Some of them are wondering whether they will be faced with the same thing that followed the first World War, a period when the country was tooled to peacetime production and demand really fell off.

Many companies among the customers will probably equip the best way they can for a short run operation and get ready for possible hard times. This is partly predicated on the fact that we do not have in sight the scaling down of taxes which followed the last war and which proved, incidentally, to be a smart move then. At best, it looks like the builders have ahead about two years of balancing out, with peacetime requirements, it is hoped, surpassing those of 1939 by a considerable margin.

Inventories, a matter most builders seem to fear, not because they won't sell them, but because there is the likelihood that they will be out of cash and will not have money to market their new products, are responsible in part for the unwillingness of many to announce their new equipment. From a builder's point of view this is understandable, since if he runs short and has to borrow money to complete engineering developments and market new equipment, there is a considerable risk involved. But if the companies have cash, they will sell the inventories for any price.

By and large, industry is not going to buy all new tools, simply because many medium and small sized companies are not going to have the money and large companies will have to make a showing to their stockholders and will be conservative in purchasing new tools. In any event, the market for new tools is limited pretty largely to new types, to special machines, and to those companies who would rather buy new machines than old ones, regardless of their condition.

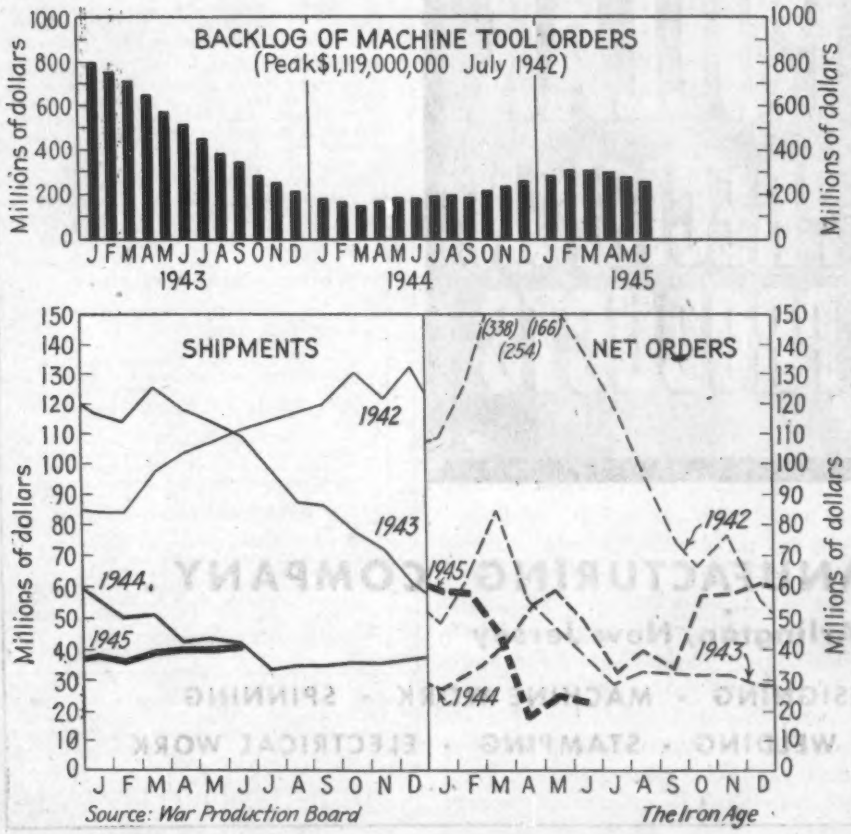
On the optimistic side, a recent series of discussions with machine tool builders sponsored by the Reconstruction Finance Corp. and Surplus Property Board to determine whether or not the industry can be of service in the liquidation of the surplus, has raised some lagging spirits. But there is little yet that suggests that a quick scheme can be devised to circumvent the long and tiring task of getting the 200,000 units (to which many machine tool minds have now reduced the surplus) off the market.

It has been pointed out many times that salesmen, in relatively regular contact with every machine tool user in the nation, might by preaching the gospel in the course of their perigrinations, succeed in getting a large number of these units off the market. This is sound in theory but how it will work in practice remains to be seen.

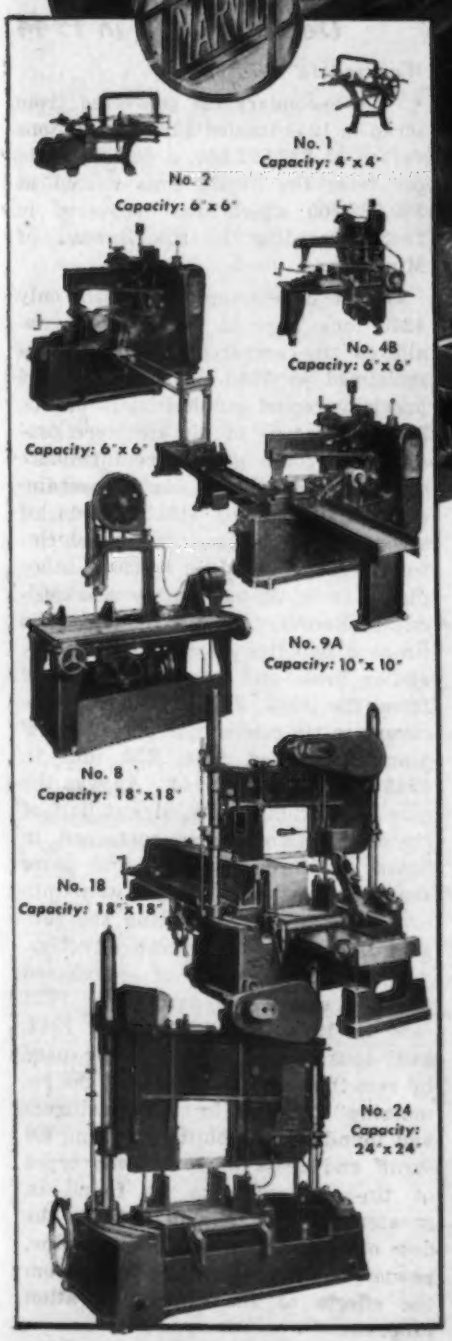
There is also the frequently mentioned matter of rebuilding in original manufacturers' shops. This is a somewhat nebulous process, since the amount of work done can easily vary with almost every unit.

The proposal is necessarily vague right now because there is no shop capacity. Nonetheless, some of the top minds in government and in the industry are feeling around for a procedure, a basis, or a policy that will make it feasible to rebuild a machine and remunerate the builder for his efforts at the same time, under present pricing regulations.

• Machine-tool shipments in June amounted to $41,040,000 as compared to $39,825,000 in May, according to a preliminary report by the Tools Div. of the War Production Board. The value of net new orders received decreased $2,997,000, or 11.4 pct in June, to $23,201,000, as compared with the previous month's figure of $26,198,000. Unfilled orders decreased to $256,871,000 in June, 6.5 pct under the May total of $274,786,000. At the current rate of shipments, WPB said, it will require approximately six months to ship orders on hand as of the end of June. The number of workers engaged in the production of machine tools during June decreased approximately 1 pct from May, from 55,000 to 54,000. As compared with June, 1944, the number of wage earners in the industry has decreased by 9300, or 15 pct.



MARVEL SAWS



Steel Warehousing Company, Chicago, features Prompt delivery - - - -

Pieces or lengths cut from bars, tubes or structural shapes can be delivered promptly by this steel warehouse, because they have the MARVEL Saws to handle any cut-off job. Three No. 9A MARVEL Automatic Bar Feed Saws (capacity 10" x 10") which automatically feed, measure and cut-off identical lengths or slices (as gear blanks) from single or nested bars at terrific speed. The fastest hack saws built—these automatic saws require no more operator attention than an automatic screw machine. They are extremely accurate, too, and can be stopped any time in a quantity run, a miscellaneous cut made, and automatic operation resumed by simply re-engaging the bar push-up.

Structural shapes up to 18" and large bars of equal diameters are saw-cut on the No. 18 MARVEL universal Roll Stroke Hack Saws. Cuts are accurately "square" and clean with practically no burrs. This modern saw which is completely armoured to stand the rough handling unavoidable where large work is done, introduces the new roll-stroke principle which enables it to cut-off the toughest steel in the largest sizes rapidly and with extremely long blade life.

For quick reference see our section in Sweet's File—Mechanical Industries or write for catalog.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave. Chicago 39, U.S.A.

***Eastern Sales Office:* 225 Lafayette St., New York 12, New York**

NON-FERROUS METALS

. . . News and Market Activities

Canadian Controls On Nickel Lifted

Toronto

• • • Munitions Minister, C. D. Howe, recently reported the rescinding of orders governing the sale and use of nickel anodes and primary nickel. The Metals Control Order concerning nickel anodes limited purchases for nickel plating to 110 lb. per calendar month and allowed dealers to carry not more than a three months' supply.

Purchases in excess of 110 lb. could be made only under permit, and a permit was also required to carry more than a three months' supply. The purchase of primary nickel was limited to 500 lb. per month, with larger quantities allowed only under permit and required reports on stock and consumption.

Nickel production in Canada during May amounted to 23,484,009 lb., compared with 21,661,372 lb. in April, and 24,023,396 lb. in May last year. Output for the first five months of this year totalled 113,155,160 lb., compared with 118,400,313 in the similar period of 1944.

Production of copper in Canada in May declined to 41,165,776 lb., from 42,954,116 lb. in April and 47,843,032 lb. in May, 1944. For the first five months this year output totalled 214,335,735 lb., compared with 236,796,564 lb. in the corresponding period of last year.

Primary unrefined lead production in May totalled 25,500,464 lb., compared with 28,172,344 lb. in April and 20,491,362 lb. in May, 1944. During the first five months this year output totalled 139,044,502 lb., compared with 132,490,590 lb. in the similar period of 1944.

Production of primary zinc was 45,427,551 lb. in May compared with 43,385,577 lb. in April and 45,646,454 lb. in May, 1944. For the five months ending with May this year output was 230,537,029 lb., which compares with 227,300,262 lb. in the corresponding period of last year.

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Lead Stocks Improving; Chemical Use Expanded

New York

• • • It is reported in the industry that the lead stockpile under current restrictions is increasing at the rate of 10,000 lb per month and is expected to reach a total of 100,000 lb by the end of September. There is some speculation among the trade that the stringency of control may be expected to be eased somewhat in view of the improved supply position.

The lead chemical control order No. 384 has currently been revised to permit increased civilian use of white lead from the former 16 pct of 1940 consumption to 25 pct. Production of white lead has now been authorized for increase from the former 30 pct of 1940 production to 40 pct. Production of red lead has now been authorized for increase to 80 pct of 1940 production as compared with the previously authorized 60 pct.

The revised order also liberalizes the use of lead oxide in ceramics and for other chemical purposes.

Sharp Drop in June Ingot Brass Shipments

Chicago

• • • The combined volume of shipments of ingot brass and bronze made during the month of June, 1945, by 54 ingot brass and bronze manufacturers, amounted to 32,613 tons, according to Defense Council of the Ingot Brass and Bronze Industry.

This figure represents a drop of nearly 5000 tons from last month's 37,262 tons, which is likewise somewhat below a fairly constant rate of about 40,000 tons per month during the war.

•

Lift Controls on High Carbon Ferrochromium

Washington

• • • Because of indicated adequate supplies, WPB has revoked controls on high carbon ferrochrome but retains controls on chrome metal and low carbon ferrochrome. The change in controls on chromium was accomplished by revoking the chromium allocation Order M-18-a, its Directions 1 and 2 and M-18-a-1. The issuance of Direction 7 to steel Order M-21 reassumed controls on chrome metal and low carbon ferrochrome. The new direction defines chromium to include low carbon ferrochrome of the two maximum carbon grades of 0.06 pct and 0.1 pct.

•

Secondary Tin Recovery Declines 14% in 1944

Washington

• • • Secondary tin recovered from scrap in 1944 totaled 32,589 short tons valued at $33,892,560, a decline of 14 pct from the 37,820 tons valued at $39,332,800 which was recovered in 1943, according to the Bureau of Mines.

Of the 32,589 tons recovered, only 4245 tons were in the form of unalloyed tin compared with 5252 tons reclaimed in 1943. As shown in a previous report on detinning plants, 3751 short tons of pig tin were produced by these plants from tinplate clippings and old tin-coated containers, while 471 tons (tin content) of secondary pig tin and 23 tons of tinfoil were produced at various other plants from tin-base scrap and residues. Recovery of tin in solder, in tin-base babbitts, in lead-base alloys, and in brass and bronze, all declined from the 1943 figures, but the recovery in tin compounds at detinners' plants increased from 250 tons in 1943 to 350 tons in 1944. As was the case in previous years, almost half of the tin reclaimed was contained in brass and bronze scrap, and more than half of that recovered went into brass and bronze, reflecting the consumption of tin-base scrap directly.

Total consumption of purchased tin-base scrap decreased from 9621 tons in 1943 to 8612 tons in 1944, 8495 tons of this amount being used by remelters and smelters and the remaining 117 tons by manufacturers and foundries. Babbitt scrap and tin scruff and dross were the only types of tin-base scrap to be found in greater quantity than in 1943, as the flow of such types as block tin pipe, pewter, and tin residues suffered from the effects of the tin conservation program.

Primary Metals

(Cents per lb., unless otherwise noted)

Aluminum, 99+%, del'd (Min. 10,000 lb.)	15.00
Antimony, American, Laredo, Tex.	14.50
Beryllium copper, 3.75-4.25% Be; dollars per lb. contained Be	$17.00
Cadmium, del'd	90.00
Cobalt, 97-99% (per lb.)	$1.50 to $1.57
Copper, electro, Conn. valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$3.00
Iridium, dollars per troy oz.	$120.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9 + %, carlots	20.50
Magnesium, 12-in. sticks, carlots	27.50
Mercury, dollars per 76-lb. flask, f.o.b. New York	$145.00 to $149.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.65

Remelted Metals

(Cents per lb. unless otherwise noted)

Aluminum, No. 12 Fdy. (No. 2)	9.00 to 10.00
Aluminum, deoxidizing No. 2, 3, 4	8.00 to 9.50
Brass Ingot	
85-5-5-5 (No. 115)	13.25
88-10-2 (No. 215)	16.75
80-10-10 (No. 305)	16.00
No. 1 Yellow (No. 405)	10.25

Copper, Copper Base Alloys

(Mill base, cents per lb.)

	Extruded Shapes	Rods	Sheets
Copper	20.37	....	20.37
Copper, H.R.	....	17.37	....
Copper drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercial bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	....

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c. (T).

Plate: 0.250 in. and heavier; 2S and 3S, 21.2c.; 52s, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.128 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base, 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 52S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11SRT-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals: ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 34c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 99 lb., 56c.; less than 25 lb., 66c.

NONFERROUS SCRAP METAL QUOTATIONS

†(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums—other prices are current quotations)

Copper, Copper Base Alloys

OPA Group 1†

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	8.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2†

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	8.00
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25
Automobile radiators	7.00
Zincy bronze borings	8.00
Zincy bronze solids	8.00

OPA Group 3†

Fired rifle shells	8.25
Brass pipe	7.50
Old rolled brass	7.00
Admiralty condenser tubes	7.50
Muntz metal condenser tubes	7.00
Plated brass sheet, pipe reflectors	6.50
Manganese bronze solids	7.25[1]
Manganese bronze solids	6.25[2]
Manganese bronze borings	6.50[1]

OPA Group 4†

Refinery brass	4.75*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Other Copper Alloys

Briquetted Cartridge Brass Turnings	8.62½
Cartridge Brass Turnings, Loose	7.87½
Loose Yellow Brass Trimmings	7.87½

Aluminum

Plant scrap, segregated	
2S solids	8.00
Dural alloys, solids 14, 17, 18, 24S 25S	4.50
turnings, dry basis	3.00
Low copper alloys 51, 52, 61, 63S solids	7.50
turnings, dry basis	5.75
Plant scrap, mixed	
Solids	4.00
Turnings, dry basis	2.75
Obsolete scrap	
Pure cable	8.00
Old sheet and utensils	6.00
Old castings and forgings	5.00
Pistons, free of struts	5.00
Pistons, with struts	3.00
Old alloy sheet	5.00

Magnesium*

Segregated plant scrap	
Pure solids and all other solids, exempt	
Borings and turnings	1.50
Mixed, contaminated plant scrap	
Grade 1 solids	3.00
Grade 1 borings and turnings	2.00
Grade 2 solids	2.00
Grade 2 borings and turnings	1.00

*Nominal.

Zinc

New zinc clippings, trimmings	6.50
Engravers, lithographers plates	6.50
Old zinc scrap	4.75
Unsweated zinc dross	5.00
Die cast slab	4.50
New die cast scrap	4.45
Radiator grilles, old and new	3.50
Old die cast scrap	3.00

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead including cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 26c. per lb.; 90 to 98% Ni, 26c. per lb contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	25½
Electrodeposited	18½
Rolled, oval, straight	19½
Curved	20½
Brass, 80-20, frt. allowed	
Cast, oval, 15 in. or longer	23½
Zinc, cast, 99.99, 15 in. or longer	16¼
Nickel, 99 per cent plus, frt. allowed	
Cast	47
Rolled, depolarized	48
Silver, 999 fine	
Rolled, 1-9 troy oz., per oz.	53*

Chemicals

(Cents per lb., f.o.b. shipping point)

Copper cyanide, 1-5 bbls.	34.00
Copper sulphate, 99.5, crystals, bbls.	7.75
Nickel salts, single, 425 lb. bbls., frt. allowed	13.50
Silver cyanide, 100 oz. lots	—.4179
Sodium cyanide, 96 per cent, domestic, 100 lb. drums	15.00
Zinc cyanide, 100 lb. drums	33.00
Zinc sulphate, 39 per cent, crystals, bbls., frt. allowed	6.35

*Price based on use of foreign silver.

SCRAP

. . . News and Market Activities

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•

BOSTON—Large consumers have withdrawn from the market, apparently being covered for nearby requirements. However, there is an active demand for all grades from brokers who are having difficulty in filling orders. Preparation of material is abnormally slow due to shortage of labor at yards. In addition, most yards have a hard time getting cars to load when needed. Foundries continue hungry for cast, their wants running into five figures. Prices hold at ceilings.

•

ST. LOUIS—Heat and the shortage of manpower have combined to cut the movement of scrap into this district by 25 pct the first week in August as compared with the corresponding period last month. Mills' consumption exceeds receipts and they have extended their commitments from 30 to 60 days delivery. Dealers hesitate to accept such business because of the uncertainty of the movement and the continued allocation to Chicago of scrap ordinarily destined to this market. Prices are unchanged.

•

CINCINNATI — Reappearance of one mill, that had been out of the market for some time, for fairly substantial purchase of openhearth scrap, gave new activity to the market during the past week. Some modest improvement in miscellaneous sales is also reported, and prices are still unchanged with most items pushing at ceilings.

•

BIRMINGHAM—The market here remains strong for all grades of material but cutbacks in shell manufacture have reduced blast furnace and foundry scrap supplies. The labor situation at dealers' yards is still serious.

Land Aims to Avoid Flooding Markets

Washington

• • • With a view to avoiding the flooding of the scrap market after VJ-Day, the Maritime Commission has planned an orderly program for the disposal of war-damaged and over-age vessels and has under consideration the question of coordinating its efforts with other government agencies that are or may be authorized to set up strategic metal reserves which would include basic metals. With specific reference to ship breaking, the Commission announced, this may well take the line of reducing steel, in ships designated for scrapping, to the form of billets to make up a stockpile of strategic reserve. As an addition to the present methods of scrapping, Vice Admiral E. S. Land, chairman of the commission, some months ago suggested a modern ship breaking private-industry, under which ships would be systematically dismantled on a year-to-year basis and all parts sold to bring the highest return to the government.

"There are many other means of disposing of ships incapable of operation and these means will be thoroughly explored before any bids for scrapping will be accepted," said Admiral Land. He added that while the Commission may continue to offer some ships for sale as scrap, the right to reject any and all bids will be exercised.

It was pointed out that recent bids on vessels offered for scrap have shown a downward trend in prices. Bids on a 9100 deadweight ton ship ranged from $15,500 to $22,500, while later bids on two 10,500-ton vessels ranged from $9000 to $12,000. All of these bids were rejected.

Going prices as obtained in the trade by IRON AGE editors, based on representative tonnages (for ceiling prices see O. P. A. schedule No. 4). Where ceiling prices are quoted they do not include brokerage fee or adjusted transportation charges. Asterisks indicate grades selling at ceilings.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00*
RR. hvy. melting	21.00*
No. 2 hvy. melting	20.00*
RR. scrap rails	21.50*
Rails 3 ft. and under	23.50*
No. 1 comp'd sheets	20.00*
Hand bdld. new shts.	20.00*
Hvy. axle turn.	19.50*
Hvy. steel forge turn.	19.50*
Mach. shop turn.	$14.50 to 15.00
Short shov. turn.	17.00*
Mixed bor. and turn.	14.50 to 15.00
Cast iron borings	16.00*
Hvy. break cast.	16.00*
No. 1 cupola	20.00*
RR. knuck. and coup.	24.50*
RR. coil springs	24.50*
Rail leaf springs	24.50*
Rolled steel wheels	24.50*
Low phos. bil. crops	25.00*
Low phos.	22.50*
RR. malleable	22.00*

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.75*
No. 2 hvy. melting	18.75*
No. 1 bundles	18.75*
No. 2 dealers' bndls.	18.75*
Bundled mach. shop turn.	18.75*
Galv. bundles	16.75*
Mach. shop turn.	13.75*
Short shovel. turn.	15.75*
Cast iron borings	14.75*
Mix. borings & turn.	13.75*
Low phos. hvy. forge.	23.75*
Low phos. plates	21.25*
No. 1 RR. hvy. melt.	19.75*
Reroll rails	22.25*
Miscellaneous rails	20.25*
Rails 3 ft. and under	22.25*
Locomotive tires, cut	22.75 to 23.25
Cut bolsters & side frames	20.25 to 21.25
Angles & splice bars	22.25*
Standard stl. car axles	25.00 to 25.50
No. 3 steel wheels	23.25*
Couplers & knuckles	23.25*
Agricul. malleable	22.00*
RR. malleable	22.00*
No. 1 mach. cast.	20.00*
No. 1 agricul. cast.	20.00*
Hvy. breakable cast.	16.50*
RR. grate bars	15.25*
Cast iron brake shoes	15.25*
Stove plate	19.00*
Clean auto cast.	20.00*
Cast iron carwheels	20.00*

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50*
No. 2 hvy. melting	19.50*
No. 1 bundles	19.50*
No. 2 bundles	19.50*
Mach. shop turn.	$8.50 to 9.00
Shoveling turn.	10.50 to 11.00
Cast iron borings	9.00 to 9.50
Mixed bor. & turn.	8.50 to 9.00
Low phos. plate	22.00*
No. 1 cupola cast.	20.00*
Hvy. breakable cast.	16.50*
Stove plate	19.00*
Scrap rails	21.00*

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting	$15.05*
No. 2 hvy. melting	15.05*
No. 1 and 2 bundles	15.05*
Busheling	15.05*
Turnings, shovelings	12.05*
Machine shop turn.	10.05*
Mixed bor. & turn.	10.05*
Cl'n cast, chem. bor.	13.06 to 14.15*

Truck delivery to foundry

Machinery cast.	21.00 to 23.51*
Breakable cast	21.57 to 21.87*
Stove plate	20.00 to 23.51*

DETROIT

Per gross ton, brokers' buying prices:

No. 1 hvy. melting	$17.32*
No. 2 hvy. melting	17.32*
No. 1 bundles	17.32*
New busheling	17.32*
Flashings	17.32*
Mach. shop turn.	12.32*
Short shov. turn.	14.32*
Cast iron borings	13.32*
Mixed bor. & turn.	12.32*
Low phos. plate	19.82*
No. 1 cupola cast.	20.00*
Charging box cast.	19.00*
Hvy. breakable cast.	16.50*
Stove plate	19.00*
Automotive cast	20.00*

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.75*
No. 2 hvy. melting	18.75*
No. 2 bundles	18.75*
Mach. shop turn.	13.75*
Shoveling turn.	15.75*
Cast iron borings	13.50 to 14.00
Mixed bor. & turn.	13.75*
No. 1 cupola cast	20.00*
Hvy. breakable cast	16.50*
Cast, charging box	19.00*
Hvy. axle forge turn.	18.25*
Low phos. plate	21.25*
Low phos. punchings	21.25*
Billet crops	21.25*
RR. steel wheels	23.25*
RR. coil springs	23.25*
RR. malleable	22.00*

ST. LOUIS

Per gross ton delivered to consumer:

Heavy melting	$17.50*
Bundled sheets	17.50*
Mach. shop turn.	10.25 to 10.75
Locomotive tires, uncut	18.00
Misc. std. sec. rails	19.00*
Rerolling rails	21.00*
Steel angle bars	21.00*
Rails 3 ft. and under	21.50*
RR. springs	22.00*
Steel car axles	23.50*
Stove plate	19.00*
Grate bars	15.25*
Brake shoes	15.25*
RR. malleable	22.00*
Cast iron carwheels	20.00*
No. 1 mach'ery cast	20.00*
Breakable cast	16.50*

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$17.00*
No. 2 hvy. melting	17.00*
No. 2 bundles	17.00*
No. 1 busheling	17.00*
Long turnings	$9.50 to 10.00
Cast iron borings	10.50 to 11.00
Bar crops and plate	19.50*
Structural and plate	19.50*
No. 1 cast	20.00*
Stove plate	17.00
Steel axles	18.00*
Scrap rails	18.50
Rerolling rails	20.50*
Angles & splice bars	20.50*
Rails 3 ft. & under	21.00*
Cast iron carwheels	16.50 to 17.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00*
No. 2 hvy. melting	20.00*
Low phos. plate	22.50*
No. 1 busheling	20.00*
Hydraulic bundles	20.00*
Mach. shop. turn.	15.00*
Short shovel. turn.	17.00*
Cast iron borings	16.00*

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$15.33*
No. 2 hvy. melting	15.33*
Comp. black bundles	15.33*
Comp. galv. bundles	13.33*
Mach. shop turn.	10.33*
Mixed bor. & turn.	10.33*
Shoveling turn.	12.33*
No. 1 cupola cast.	20.00*
Hvy. breakable cast	16.50*
Charging box cast	19.00*
Stove plate	19.00*
Clean auto cast.	20.00*
Unstrip. motor blks.	17.50*
Cl'n chem. cast bor.	14.33*

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.25*
No. 1 bundles	19.25*
No. 2 bundles	19.25*
No. 2 hvy. melting	19.25*
Mach. shop turn.	14.25*
Shoveling turn.	16.25*
Cast iron borings	15.25*
Mixed bor. & turn.	14.25*
No. 1 cupola cast.	20.00*
Stove plate	19.00*
Low phos. plate	21.75*
Scrap rails	20.75*
Rails 3 ft. & under	22.75*
RR. steel wheels	23.75*
Cast iron car wheels	20.00*
RR. coil & leaf spgs.	23.75*
RR. knuckles & coup.	23.75*
RR. malleable	22.00*
No. 1 busheling	19.25*

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50*
No. 2 hvy. melting	19.50*
Compressed sheet stl.	19.50*
Drop forge flashings	19.00*
No. 2 bundles	19.50*
Mach. shop turn.	14.50*
Short shovel.	16.50*
No. 1 busheling	19.50*
Steel axle turn.	19.00*
Low phos. billet and bloom crops	24.50*
Cast iron borings	15.50*
Mixed bor. & turn.	14.50*
No. 2 busheling	17.00*
No. 1 machine cast	20.00*
Railroad cast	20.00*
Railroad grate bars	15.25*
Stove plate	19.00*
RR. hvy. melting	20.50*
Rails 3 ft. & under	23.00*
Rails 18 in. & under	24.25*
Rails for rerolling	23.00*
Railroad malleable	22.00*
Elec. furnace punch	22.00*

SAN FRANCISCO

Per gross ton delivered to consumer:

RR. hvy. melting	$16.50
No. 1 hvy. melting	16.50
No. 2 hvy. melting	15.00
No. 2 bales	$13.50 to 14.25
No. 3 bales	9.50 to 10.59
Mach. shop turn.	7.00
Elec. furn. 1 ft., und.	15.50 to 17.00
No. 1 cupola cast.	19.00 to 21.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	$14.50 to $15.50
No. 2 hvy. melting	13.50 to 14.50
No. 2 bales	12.50 to 13.50
No. 3 bales	9.00 to 10.00
Mach. shop turn.	4.50
No. 1 cupola cast.	19.00 to 21.00

SEATTLE

Per gross ton delivered to consumer:

RR. hvy. melting	$14.50
No. 1 hvy. melting	14.50*
No. 3 bundles	11.50
Elec. furn. 1 ft., und.	17.00
No. 1 cupola cast.	20.00*

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NEW YORK — Scrap continues even tighter than recently in this market with all consumers' stocks apparently limited causing them to call for immediate deliveries on outstanding contracts. The yards are dry of scrap, however, due to a somewhat worsened labor condition following the recent slight improvement. The largest consumer is reported to continue to exert pressure for delivery, contrary to reports from some sources. One broker feels confident that, if there were need for shipment out of the district, consumers as far away as the Valley would be willing to pay the nearly $2 springboard required.

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BOSTON—Large consumers have withdrawn from the market, apparently being covered for nearby requirements. However, there is an active demand for all grades from brokers who are having difficulty in filling orders. Preparation of material is abnormally slow due to shortage of labor at yards. In addition, most yards have a hard time getting cars to load when needed. Foundries continue hungry for cast, their wants running into five figures. Prices hold at ceilings.

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ST. LOUIS—Heat and the shortage of manpower have combined to cut the movement of scrap into this district by 25 pct the first week in August as compared with the corresponding period last month. Mills' consumption exceeds receipts and they have extended their commitments from 30 to 60 days delivery. Dealers hesitate to accept such business because of the uncertainty of the movement and the continued allocation to Chicago of scrap ordinarily destined to this market. Prices are unchanged.

•

CINCINNATI — Reappearance of one mill, that had been out of the market for some time, for fairly substantial purchase of openhearth scrap, gave new activity to the market during the past week. Some modest improvement in miscellaneous sales is also reported, and prices are still unchanged with most items pushing at ceilings.

•

BIRMINGHAM—The market here remains strong for all grades of material but cutbacks in shell manufacture have reduced blast furnace and foundry scrap supplies. The labor situation at dealers' yards is still serious.

Land Aims to Avoid Flooding Markets

Washington

• • • With a view to avoiding the flooding of the scrap market after VJ-Day, the Maritime Commission has planned an orderly program for the disposal of war-damaged and over-age vessels and has under consideration the question of coordinating its efforts with other government agencies that are or may be authorized to set up strategic metal reserves which would include basic metals. With specific reference to ship breaking, the Commission announced, this may well take the line of reducing steel, in ships designated for scrapping, to the form of billets to make up a stockpile of strategic reserve. As an addition to the present methods of scrapping, Vice Admiral E. S. Land, chairman of the commission, some months ago suggested a modern ship breaking private-industry, under which ships would be systematically dismantled on a year-to-year basis and all parts sold to bring the highest return to the government.

"There are many other means of disposing of ships incapable of operation and these means will be thoroughly explored before any bids for scrapping will be accepted," said Admiral Land. He added that while the Commission may continue to offer some ships for sale as scrap, the right to reject any and all bids will be exercised.

It was pointed out that recent bids on vessels offered for scrap have shown a downward trend in prices. Bids on a 9100 deadweight ton ship ranged from $15,500 to $22,500, while later bids on two 10,500-ton vessels ranged from $9000 to $12,000. All of these bids were rejected.

Going prices as obtained in the trade by IRON AGE editors, based on representative tonnages (for ceiling prices see O. P. A. schedule No. 4). Where ceiling prices are quoted they do not include brokerage fee or adjusted transportation charges. Asterisks indicate grades selling at ceilings.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting		$20.00*
RR. hvy. melting		21.00*
No. 2 hvy. melting		20.00*
RR. scrap rails		21.50*
Rails 3 ft. and under		23.50*
No. 1 comp'd sheets		20.00*
Hand bdld. new shts.		20.00*
Hvy. axle turn.		19.50*
Hvy. steel forge turn.		19.50*
Mach. shop turn.	$14.50 to	15.00
Short shov. turn.		17.00*
Mixed bor. and turn.	14.50 to	15.00
Cast iron borings		16.00*
Hvy. break cast.		16.00*
No. 1 cupola		20.00*
RR. knuck. and coup.		24.50*
RR. coil springs		24.50*
Rail leaf springs		24.50*
Rolled steel wheels		24.50*
Low phos. bil. crops		25.00*
Low phos.		22.50*
RR. malleable		22.00*

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting		$18.75*
No. 2 hvy. melting		18.75*
No. 1 bundles		18.75*
No. 2 dealers' bndls.		18.75*
Bundled mach. shop turn.		18.75*
Galv. bundles		16.75*
Mach. shop turn.		13.75*
Short shovel, turn.		15.75*
Cast iron borings		14.75*
Mix. borings & turn.		13.75*
Low phos. hvy. forge		23.75*
Low phos. plates		21.25*
No. 1 RR. hvy. melt.		19.75*
Reroll rails		22.25*
Miscellaneous rails		20.25*
Rails 3 ft. and under		22.25*
Locomotive tires, cut	22.75 to	23.25
Cut bolsters & side frames	20.25 to	21.25
Angles & splice bars		22.25*
Standard stl. car axles	25.00 to	25.50
No. 3 steel wheels		23.25*
Couplers & knuckles		23.25*
Agricul. malleable		22.00*
RR. malleable		22.00*
No. 1 mach. cast		20.00*
No. 1 agricul. cast		20.00*
Hvy. breakable cast		16.50*
RR. grate bars		15.25*
Cast iron brake shoes		15.25*
Stove plate		19.00*
Clean auto cast		20.00*
Cast iron carwheels		20.00*

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting		$19.50*
No. 2 hvy. melting		19.50*
No. 1 bundles		19.50*
No. 2 bundles		19.50*
Mach. shop turn.	$8.50 to	9.00
Shoveling turn.	10.50 to	11.00
Cast iron borings	9.00 to	9.50
Mixed bor. & turn.	8.50 to	9.00
Low phos. plate		22.00*
No. 1 cupola cast		20.00*
Hvy. breakable cast.		16.50*
Stove plate		19.00*
Scrap rails		21.00*

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting		$15.05*
No. 2 hvy. melting		15.05*
No. 1 and 2 bundles		15.05*
Busheling		15.05*
Turnings, shovelings		12.05*
Machine shop turn.		10.05*
Mixed bor. & turn.		10.05*
Cl'n cast, chem. bor.	13.06 to	14.15*
Truck delivery to foundry		
Machinery cast	21.00 to	23.51*
Breakable cast	21.57 to	21.87*
Stove plate	20.00 to	23.51*

DETROIT

Per gross ton, brokers' buying prices:

No. 1 hvy. melting	$17.32*
No. 2 hvy. melting	17.32*
No. 1 bundles	17.32*
New busheling	17.32*
Flashings	17.32*
Mach. shop turn.	12.32*
Short shov. turn.	14.32*
Cast iron borings	13.32*
Mixed bor. & turn.	12.32*
Low phos. plate	19.82*
No. 1 cupola cast	20.00*
Charging box cast.	19.00*
Hvy. breakable cast.	16.50*
Stove plate	19.00*
Automotive cast	20.00*

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting		$18.75*
No. 2 hvy. melting		18.75*
No. 2 bundles		18.75*
Mach. shop turn.		13.75*
Shoveling turn.		15.75*
Cast iron borings	13.50 to	14.00
Mixed bor. & turn.		13.75*
No. 1 cupola cast		20.00*
Hvy. breakable cast		16.50*
Cast, charging box		19.00*
Hvy. axle forge turn.		18.25*
Low phos. plate		21.25*
Low phos. punchings		21.25*
Billet crops		21.25*
RR. steel wheels		23.25*
RR. coil springs		23.25*
RR. malleable		22.00*

ST. LOUIS

Per gross ton delivered to consumer:

Heavy melting		$17.50*
Bundled sheets		17.50*
Mach. shop turn.	10.25 to	10.75
Locomotive tires, uncut		18.00
Misc. std. sec. rails		19.00*
Rerolling rails		21.00*
Steel angle bars		21.00*
Rails 3 ft. and under		21.50*
RR. springs		22.00*
Steel car axles		23.50*
Stove plate		19.00*
Grate bars		15.25*
Brake shoes		15.25*
RR. malleable		22.00*
Cast iron carwheels		20.00*
No. 1 mach'ery cast		20.00*
Breakable cast		16.50*

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting		$17.00*
No. 2 hvy. melting		17.00*
No. 2 bundles		17.00*
No. 1 busheling		17.00*
Long turnings	$9.50 to	10.00
Cast iron borings	10.50 to	11.00
Bar crops and plate		19.50*
Structural and plate		19.50*
No. 1 cast		20.00*
Stove plate		17.00
Steel axles		18.00*
Scrap rails		18.50
Rerolling rails		20.50*
Angles & splice bars		20.50*
Rails 3 ft. & under		21.00*
Cast iron carwheels	16.50 to	17.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00*
No. 2 hvy. melting	20.00*
Low phos. plate	22.50*
No. 1 busheling	20.00*
Hydraulic bundles	20.00*
Mach. shop. turn.	15.00*
Short shovel. turn.	17.00*
Cast iron borings	16.00*

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$15.33*
No. 2 hvy. melting	15.33*
Comp. black bundles	15.33*
Comp. galv. bundles	13.33*
Mach. shop turn.	10.33*
Mixed bor. & turn.	10.33*
Shoveling turn.	12.33*
No. 1 cupola cast	20.00*
Hvy. breakable cast	16.50*
Charging box cast	19.00*
Stove plate	19.00*
Clean auto cast	20.00*
Unstrip. motor blks.	17.50*
Cl'n chem. cast bor.	14.33*

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.25*
No. 1 bundles	19.25*
No. 2 bundles	19.25*
No. 2 hvy. melting	19.25*
Mach. shop turn.	14.25*
Shoveling turn.	16.25*
Cast iron borings	15.25*
Mixed bor. & turn.	14.25*
No. 1 cupola cast	20.00*
Stove plate	19.00*
Low phos. plate	21.75*
Scrap rails	20.75*
Rails 3 ft. & under	22.75*
RR. steel wheels	23.75*
Cast iron car wheels	20.00*
RR. coil & leaf spgs.	23.75*
RR. knuckles & coup.	23.75*
RR. malleable	22.00*
No. 1 busheling	19.25*

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50*
No. 2 hvy. melting	19.50*
Compressed sheet stl.	19.50*
Drop forge flashings	19.00*
No. 2 bundles	19.50*
Mach. shop turn.	14.50*
Short shovel.	16.50*
No. 1 busheling	19.50*
Steel axle turn.	19.00*
Low phos. billet and bloom crops	24.50*
Cast iron borings	15.50*
Mixed bor. & turn.	14.50*
No. 2 busheling	17.00*
No. 1 machine cast	20.00*
Railroad cast	20.00*
Railroad grate bars	15.25*
Stove plate	19.00*
RR. hvy. melting	20.50*
Rails 3 ft. & under	23.00*
Rails 18 in. & under	24.25*
Rails for rerolling	23.00*
Railroad malleable	22.00*
Elec. furnace punch	22.00*

SAN FRANCISCO

Per gross ton delivered to consumer:

RR. hvy. melting		$16.50
No. 1 hvy. melting		16.50
No. 2 hvy. melting		15.00
No. 2 bales	$13.50 to	14.25
No. 3 bales	9.50 to	10.59
Mach. shop turn.		7.00
Elec. furn. 1 ft., und.	15.50 to	17.00
No. 1 cupola cast	19.00 to	21.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	$14.50 to	$15.50
No. 2 hvy. melting	13.50 to	14.50
No. 2 bales	12.50 to	13.50
No. 3 bales	9.00 to	10.00
Mach. shop turn.		4.50
No. 1 cupola cast	19.00 to	21.00

SEATTLE

Per gross ton delivered to consumer:

RR. hvy. melting	$14.50
No. 1 hvy. melting	14.50*
No. 3 bundles	11.50
Elec. furn. 1 ft., und.	17.00
No. 1 cupola cast	20.00*

Comparison of Prices . .

Advances Over Past Week in Heavy Type; Declines in *Italics*. Prices are F.O.B. Major Basing Points. The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 142-151.

Flat Rolled Steel (Cents Per Lb.)	Aug. 7, 1945	July 31, 1945	July 3, 1945	Aug. 8, 1944
Hot rolled sheets	2.20	2.20	2.20	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.70	3.70	3.70	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.25	2.25	2.25	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.25	2.25	2.25	2.15
Cold finished bars	2.75	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Bright wire	2.75	2.75	2.75	2.60
Wire nails	2.90	2.90	2.90	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$43.00	$43.00	$43.00	$40.00
Light rails	45.00	45.00	45.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$36.00	$36.00	$36.00	$34.00
Sheet bars	36.00	36.00	36.00	34.00
Slabs, rerolling	36.00	36.00	36.00	34.00
Forging billets	42.00	42.00	42.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.15	2.15	2.15	2.00
Skelp	1.90	1.90	1.90	1.90

Latest steel price increase, Amendment 13 to RPS6, effective May 23, 1945.

Pig Iron: (Per Gross Ton)	Aug. 7, 1945	July 31, 1945	July 3, 1945	Aug. 8, 1944
No. 2 fdy., Philadelphia	$26.84	$26.84	$26.84	$25.84
No. 2, Valley furnace	25.00	25.00	25.00	24.00
No. 2, Southern, Cin'ti	26.11	26.11	26.11	25.11
No. 2, Birmingham	21.38	21.38	21.38	20.38
No. 2, foundry, Chicago†	25.00	25.00	25.00	24.00
Basic, del'd eastern Pa.	26.34	26.34	26.34	25.34
Basic, Valley furnace	24.50	24.50	24.50	23.50
Malleable, Chicago†	25.00	25.00	25.00	24.00
Malleable, Valley	25.00	25.00	25.00	24.00
L. S. charcoal, Chicago*	42.34	42.34	42.34	37.34
Ferromanganese‡	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡ For carlots at seaboard.
Last pig iron price change authorized by OPA effective Feb. 14, 1945.
* Charcoal price increase retroactive to March 7, on contracts to Feb. 13.

Scrap: (Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.32	17.32	17.32	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Chicago	20.00	20.00	20.00	20.00
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$7.50	$7.50	$7.50	$7.00
Foundry coke, prompt	9.00	9.00	9.00	8.25
Non-Ferrous Metals: (Cents Per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	14.50	14.50	14.50	14.50

Composite Prices . .

Starting with the issue of April 22, 1943, the weighted finished steel price index was revised for the years 1941, 1942 and 1943. See explanation of the change on page 90 of the April 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite prices for the current quarter are an estimate based on finished steel shipments for the previous quarter. These figures will be revised when the actual data of shipments for this quarter are compiled.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
August 7, 1945	2.41571c. a Lb.	$24.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.41571c. a Lb.	$24.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.41571c. a Lb.	$24.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.30837c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton

	HIGH	LOW	HIGH	LOW	HIGH	LOW
1945	2.41571c., May 29	2.21189c., Jan. 2	$24.61, Feb. 20	$23.61, Jan. 2	$19.17	$19.17
1944	2.30837c., Sept. 5	2.21189c., Oct. 5	$23.61	$23.61	19.17	$15.67, Oct. 24
1943	2.25513c.	2.25513c.	23.61	23.61	19.17	19.17
1942	2.26190c.	2.26190c.	23.61	23.61	19.17	19.17
1941	2.43078c.	2.43078c.	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 8
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c. Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 8

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

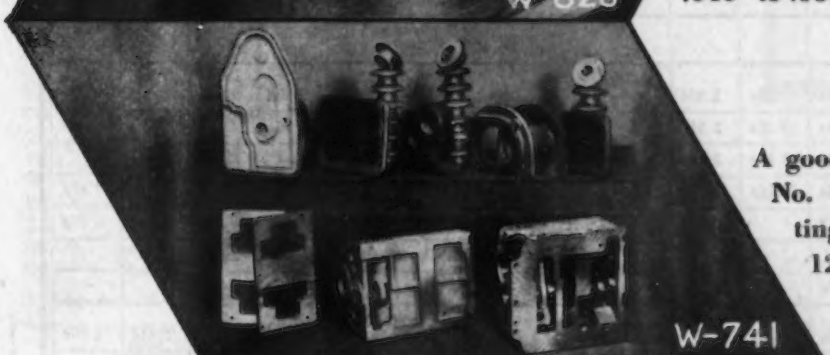
Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

FOR PRODUCTION PUT IT ON THE BLANCHARD

These steel forged rocker arms are ground on a No. 11 Blanchard Surface Grinder and 1800-2000 pieces are produced per eight hour shift, stock removal .005" to commercial limits.

One of many airplane engine parts ground on the No. 18 Blanchard Surface Grinder. 109 of these nickel steel cams are produced per hour, stock removal .040" to .060", to ± .001".



A good example of the way Blanchard No. 18 Surface Grinders are eliminating hand scraping. Fifteen Gear boxes 12" x 12" x 3" or 30 surfaces are ground per hour, removing .070" each side for oil-tight joints.

These nickel steel forgings are bearing caps for the master rods of radial engines. Twelve of these caps are ground in one operation requiring only 27 minutes, average stock removal .075".

Send for your free copy of "Work Done on the Blanchard", third edition. This new book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

BLANCHARD

The BLANCHARD MACHINE COMPANY

64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.

Prices of Finished Iron and Steel . . .

Steel prices shown here are f.o.b. basing points, in cents per lb. unless otherwise indicated. Extras apply. Delivered prices do not reflect 3% tax on freight. (1) Mill run sheet, 10c. per 100 lb. under base; primes, 25c. above base. (2) Unassorted commercial coating. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25c. per 100 lb. to fabricators. (8) Also shafting. For quantities of 20,000 to 39,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (11) Boxed. (12) This base price for annealed, bright finish wires, commercial spring wire. (13) Produced to dimensional tolerances in AISI Manual Sect. 6. For price exceptions to finished and semi-finished steels turn several pages.

Basing Point / Product	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	10 Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.30¢	2.20¢		2.75¢	2.30¢	2.44¢	2.37¢
Cold rolled [1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 gage)	3.70¢	3.70¢	3.70¢		3.70¢	3.70¢	3.70¢	3.70¢	3.80¢	3.70¢		4.25¢		3.94¢	3.87¢
Enameling (20 gage)	3.45¢	3.45¢	3.45¢	3.45¢			3.45¢		3.55¢	3.45¢		4.10¢	3.55¢	3.31¢	3.77¢
Long ternes [2]	3.80¢	3.80¢	3.80¢									4.55¢		4.16¢	4.13¢
STRIP															
Hot rolled [3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold rolled [4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester=3.00¢)					2.90¢	3.16¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester=3.35¢)					3.05¢	3.31¢	
TIN PLATE															
Standard cokes, base box	$5.00	$5.00	$5.00						$5.10					5.36¢	5.32¢
Electro, box 0.25 lb.	$4.35	$4.35	$4.35												
Electro, box 0.50 lb.	$4.50	$4.50	$4.50						$4.60						
Electro, box 0.75 lb.	$4.65		$4.65						$4.75						
BLACK PLATE															
29 gage [5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[11]			3.37¢
TERNES, MFG.															
Special coated, base box	$4.30	$4.30	$4.30						$4.40						
BARS															
Carbon steel	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢		(Duluth=2.35¢)			2.60¢	2.90¢	2.35¢	2.59¢	2.57¢
Rail steel [6]	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢					2.60¢	2.90¢			
Reinforcing (billet) [7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢	2.25¢	2.39¢	
Reinforcing (rail) [7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	2.55¢	2.25¢		2.47¢
Cold finished [8]	2.75¢	2.75¢	2.75¢	2.75¢		2.75¢			(Detroit=2.80¢)		(Toledo=2.90¢)			3.09¢	3.07¢
Alloy, hot rolled	2.70¢	2.70¢				2.70¢		(Bethlehem, Massillon, Canton=2.70¢)					2.80¢		
Alloy, cold drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
PLATES								(Coatesville and Claymont=2.25¢)							
Carbon steel [13]	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢		2.25¢	2.25¢			2.60¢	2.80¢	2.47¢	2.44¢	2.30¢
Floor plates	3.50¢	3.50¢									3.85¢	4.15¢		3.86¢	3.82¢
Alloy	3.50¢	3.50¢			(Coatesville=3.50¢)						3.95¢	4.15¢		3.70¢	3.59¢
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem=2.10¢)			2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester=3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester=4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester=6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester=8.55¢)								
WIRE [9]															
Bright [12]	2.75¢	2.75¢		2.75¢	2.75¢		(Worcester=2.85¢)		(Duluth=2.80¢)			3.25¢			3.07¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire base														
Spring (High Carbon)	3.35¢	3.35¢		3.35¢			(Worcester=3.45¢)					3.85¢			3.67¢
PILING															
Steel Sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

SEMI-FINISHED STEEL

Ingots, Carbon, Rerolling

Base per gross ton, f.o.b. mill.... $31.00

Ingots, Carbon, Forging

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown $36.00

Ingots, Alloy

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Coatesville, Chicago, Massillon, Pittsburgh $45.00

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; delivered E. Michigan, $3 higher; f.o.b. Duluth, billets only, $2.00 higher; billets f.o.b. Pacific ports are $12 higher. Provo, $11.20 higher. Delivered prices do not reflect three per cent tax on freight rates.

	Per Gross Ton
Rerolling	$36.00
Forging quality	42.00

Alloy Billets, Blooms, Slabs

Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem, per gross ton $54.00

Price delivered Detroit $2.00 higher; East Michigan, $3.00 higher.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point.

	Per Gross Ton
Open hearth or bessemer	$36.00

PRICES

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)

	Per Lb.
Pittsburgh, Chicago, Cleveland	2.15c.
Worcester, Mass.	2.25c.
Birmingham	2.15c.
San Francisco	2.65c.
Galveston	2.40c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

Shell Steel

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.00 higher; East Michigan, $3 higher.

Price Exceptions: Follansbee Steel Corp. permitted to sell at $13.00 per gross ton, f.o.b. Toronto, Ohio, above base price of $52.00.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

RAILS, TRACK SUPPLIES

(F.o.b. Mill)

Standard rails, heavier than 60 lb., No. 1 O.H., gross ton	$43.00
Angle splice bars, 100 lb.	2.70
(F.o.b. Basing Points)	*Per Gross Ton*
Light rails (from billets)	$45.00
Light rails (from rail steel)	44.00
	Base per Lb.
Cut spikes	3.35c.
Screw spikes	5.40c.
Tie plate, steel	2.30c.
Tie plates, Pacific Coast	2.45c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25c.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 3c. higher.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points Named	*Pacific Coast Basing Points†*
	Base per Keg	
Standard wire nails	$2.90	$3.40
Coated nails	2.90	3.40
Cut nails, carloads	3.85	....
	Base per 100 Lb.	
Annealed fence wire	$3.05	$3.55
Annealed galv. fence wire	3.40	3.90
	Base Column	
Woven wire fence*	67	85
Fence posts, carloads	69	86
Single loop bale ties	66	91
Galvanized barbed wire**	72	82
Twisted barbless wire	72	....

*15½ gage and heavier. **On 80-rod spools in carload quantities.

†Prices subject to switching or transportation charges.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendment to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-45 Ann.
**Philadelphia	$3.518	$4.872[5]	$4.768a	$3.922	$4.772	$3.605	$3.666	$3.822	$4.172	$5.816	$6.866	$7.072	$8.172
New York	3.59	4.613[5]	5.110	3.974[6]	4.772	3.768	3.758	3.853	4.203	5.858	6.908	7.103	8.203
Boston	3.744	4.744[9]	5.224[9]	4.106	4.715	3.912	3.912	4.044	4.244	6.012	7.062	7.194	8.394
Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.152	....	....	....	....
Norfolk	3.771	4.965	5.371	4.165	4.865	3.971	4.002	4.065	4.265	....	....	....	....
Chicago	3.25	4.20	5.231	3.60	4.65[17]	3.55	3.55	3.50	3.85	5.60	6.65	6.65	7.90
Milwaukee	3.387	4.337[3]	5.272[4]	3.737	4.787[17]	3.687	3.687	3.637	3.987	5.837	6.887	6.887	7.987
Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.588	3.35	3.85	5.806	6.856	6.65	7.75
Buffalo	3.35	4.40	4.754	3.819	4.669	3.63	3.40	3.35	3.85	5.60	6.65	6.65	7.75
Detroit	3.45	4.50	5.004	3.70	4.859[17]	3.609	3.661	3.45	3.90	5.93	6.98	6.959	8.059
Cincinnati	3.425	4.475[3]	4.825[5]	3.675	4.711	3.661	3.691	3.611	4.111	5.95	7.00	7.011	8.261
St. Louis	3.397	4.347[3]	5.172[4]	3.747	4.931[17]	3.697	3.697	3.647	4.131	5.981	7.031	7.031	8.131
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.85	5.60	6.65	6.65	7.90
St. Paul	3.50	4.46	5.257[4]	3.86	5.102[17]	3.8113	3.8113	3.7613	3.461	5.94	5.99	7.361	8.461
Omaha	3.865	5.443	5.608[4]	4.215	....	4.165	4.165	4.115	4.543	....	....	....	....
Indianapolis	3.518	4.568	4.548	3.768	4.741	3.63	3.63	3.58	4.00	5.93	6.98	6.98	8.23
Birmingham	3.45	....	4.75	3.70	....	3.55	3.55	3.50	4.53	....	....	....	....
Memphis	3.965[7]	4.66	5.265	4.215	....	4.065	4.065	4.015	4.33	....	....	....	....
New Orleans	4.058*	5.079	5.358	4.308	....	4.158	4.158*	4.108*	4.729	....	....	....	....
Houston	3.763	5.573	6.313[1]	4.313	....	4.25	4.25	3.75	6.473[3]	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.20[3]	6.10[4]	4.95	5.613[15]	4.95	4.65	4.40	5.683	8.204	9.404	9.304	10.454
San Francisco	4.55[14]	7.30[4]	6.35[4]	4.50[14]	7.333[17]	4.65[14]	4.35[14]	4.15[14]	5.433	8.304	9.404	9.404	10.454
Seattle	4.65[12]	7.05[4]	5.95[4]	4.25[12]	....	4.75[12]	4.45[12]	4.35[12]	5.883	....	9.404	....	....
Portland	4.65[11]	6.60[4]	5.75[4]	4.75[11]	....	4.85[11]	4.45[11]	4.45[11]	5.633	8.304	9.404	8.304	9.404
Salt Lake City	4.530[17]	....	6.17[13]	5.53[17]	....	4.98[17]	4.98[17]	4.88[17]	6.00	....	....	....	....

National Emergency Steels

MILL EXTRAS

Designation	Basic Open-Hearth		Electric Furnace		Designation	Basic Open-Hearth		Electric Furnace	
	Bars and Bar-Strip	Billets, Blooms, and Slabs	Bars and Bar-Strip	Billets, Blooms, and Slabs		Bars and Bar-Strip	Billets, Blooms, and Slabs	Bars and Bar-Strip	Billets, Blooms, and Slabs
NE 8612	0.65¢	$13.00	$1.15	$23.00	NE 9427	0.75¢	$15.00	$1.25	$25.00
NE 8615	0.65	13.00	1.15	23.00	NE 9430	0.75	15.00	1.25	25.00
NE 8617	0.65	13.00	1.15	23.00	NE 9432	0.75	15.00	1.25	25.00
NE 8620	0.65	13.00	1.15	23.00	NE 9435	0.75	15.00	1.25	25.00
NE 8622	0.65	13.00	1.15	23.00	NE 9437	0.75	15.00	1.25	25.00
NE 8625	0.65	13.00	1.15	23.00	NE 9440	0.75	15.00	1.25	25.00
NE 8627	0.65	13.00*	1.15	23.00	NE 9442	0.80	16.00	1.30	26.00
NE 8630	0.65	13.00	1.15	23.00	NE 9445	0.80	16.00	1.30	26.00
NE 8632	0.65	13.00	1.15	23.00	NE 9447	0.80	16.00	1.30	26.00
NE 8635	0.65	13.00	1.15	23.00	NE 9450	0.80	16.00	1.30	26.00
NE 8637	0.65	13.00	1.15	23.00					
NE 8640	0.65	13.00	1.15	23.00					
NE 8642	0.65	13.00	1.15	23.00	NE 9722	0.65	13.00	1.15	23.00
NE 8645	0.65	13.00	1.15	23.00	NE 9727	0.65	13.00	1.15	23.00
NE 8647	0.65	13.00	1.15	23.00	NE 9732	0.65	13.00	1.15	23.00
NE 8650	0.65	13.00	1.15	23.00	NE 9737	0.65	13.00	1.15	23.00
					NE 9742	0.65	13.00	1.15	23.00
					NE 9745	0.65	13.00	1.15	23.00
NE 8712	0.70	14.00	1.20	24.00	NE 9747	0.65	13.00	1.15	23.00
NE 8715	0.70	14.00	1.20	24.00	NE 9750	0.65	13.00	1.15	23.00
NE 8717	0.70	14.00	1.20	24.00	NE 9763	0.65	13.00	1.15	23.00
NE 8720	0.70	14.00	1.20	24.00	NE 9768	0.65	13.00	1.15	23.00
NE 8722	0.70	14.00	1.20	24.00					
NE 8725	0.70	14.00	1.20	24.00					
NE 8727	0.70	14.00	1.20	24.00	NE 9830	1.30	26.00	1.80	36.00
NE 8730	0.70	14.00	1.20	24.00	NE 9832	1.30	26.00	1.80	36.00
NE 8732	0.70	14.00	1.20	24.00	NE 9836	1.30	26.00	1.80	36.00
NE 8735	0.70	14.00	1.20	24.00	NE 9837	1.30	26.00	1.80	36.00
NE 8737	0.70	14.00	1.20	24.00	NE 9840	1.30	26.00	1.80	36.00
NE 8740	0.70	14.00	1.20	24.00	NE 9842	1.30	26.00	1.80	36.00
NE 8742	0.70	14.00	1.20	24.00	NE 9845	1.30	26.00	1.80	36.00
NE 8745	0.70	14.00	1.20	24.00	NE 9847	1.30	26.00	1.80	36.00
NE 8747	0.70	14.00	1.20	24.00	NE 9850	1.30	26.00	1.80	36.00
NE 8750	0.70	14.00	1.20	24.00					
					NE 9912	1.20	24.00	1.55	31.00
NE 9415	0.75	15.00	1.25	25.00	NE 9915	1.20	24.00	1.55	31.00
NE 9417	0.75	15.00	1.25	25.00	NE 9917	1.20	24.00	1.55	31.00
NE 9420	0.75	15.00	1.25	25.00	NE 9920	1.20	24.00	1.55	31.00
NE 9422	0.75	15.00	1.25	25.00	NE 9922	1.20	24.00	1.55	31.00
NE 9425	0.75	15.00	1.25	25.00	NE 9925	1.20	24.00	1.65	31.00

Note 1: The ranges shown are restricted to sizes 100 sq. in. or less or equivalent cross-sectional area 18 in. wide or under with a maximum individual piece weight of 7000 lb. irrespective of size. Note 2: For steels ordered to such ranges, below the size and weight restriction, the average of all the chemical checks must be within the limits specified subject to check analysis variations given in Table 4, Section 10, AISI Steel Products Manual. Note 3: When acid open-hearth is specified and acceptable, add to basic open-hearth alloy differential 0.25c. per lb. for bars and bar strip and $5 per gross ton for billets, blooms and slabs. Note 4: The extras shown are in addition to the base price of $2.70 for 100 lb. on finished products and $54 per gross ton on semi-finished steel, major basing points, and are in cents per pound when applicable to bars and bar-strip and in dollars per gross ton when applicable to billets, blooms and slabs. The full extra applicable over the base price is the total of all extras indicated by the specific requirements of the order. The higher extra shall be charged for any size falling between two published extras.

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD ROLLED: Sheets, 400 to 1499 lb.; strip, extras on all quantities; bars, 1500 lb. base.

NE ALLOY BARS: 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 199 lb. (7) 400 to 1499 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb. and over. (15) 1000 lb. and over. (16) 1500 lb. and over. (17) 2000 lb. and over. (18) 3500 lb. and over.

(a) Philadelphia: Galvanized sheet, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

*Add 0.271c. for sizes not rolled in Birmingham.

**City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports**)

	Per Gross Ton
Old range, bessemer, 51.50	$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorus, 51.50	4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

PRICES

WELDED PIPE AND TUBING

Base discounts, f.o.b. Pittsburgh district and Lorain, Ohio, mills
(F.o.b. Pittsburgh only on wrought pipe) base price—$200.00 per net ton

	Black	Galv.
Steel (buttweld)		
½-in.	63½	51
¾-in.	66½	55
1-in. to 3-in.	68½	57½
Wrought Iron (buttweld)		
½-in.	24	3½
¾-in.	30	10
1-in. and 1¼-in.	34	16
1½-in.	38	18½
2-in.	37½	18
Steel (lapweld)		
2-in.	61	49½
2½-in. and 3-in.	64	52½
3½-in. to 6-in.	66	54½
Wrought Iron (lapweld)		
2-in.	30½	12
2½-in. to 3½-in.	31½	14½
4-in.	33½	18
4½-in. to 8-in.	32½	17
Steel (butt, extra strong, plain ends)		
½-in.	61½	50½
¾-in.	65½	54½
1-in. to 3-in.	67	57
Wrought Iron (same as above)		
½-in.	25	6
¾-in.	31	12
1-in. to 2-in.	38	19½
Steel (lap, extra strong, plain ends)		
2-in.	59	48½
2½-in. and 3-in.	63	52½
3½-in. to 6-in.	66½	56
Wrought Iron (same as above)		
2-in.	33½	15½
2½-in. to 4-in.	39	22½
4½-in. to 6-in.	37½	21

On buttweld and lapweld steel pipe jobbers are granted a discount of 5 pct. On l.c.l. shipments prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lapweld and one point lower discount, or $2 a ton higher on all buttweld.

CAST IRON WATER PIPE

	per net ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle	71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger are $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect 3 pct tax on freight rates.

BOILER TUBES

Seamless steel and lapweld commercial boiler tubes and locomotive tubes, Minimum wall. Net base prices per 100 ft f.o.b. Pittsburgh, in carload lots.

	Seamless Cold Drawn	*Hot Rolled*	*Lap Weld, Hot Rolled*
2 in. O.D. 13 B.W.G.	15.03	13.04	12.38
2½ in. O.D. 12 B.W.G.	20.21	17.54	16.58
3 in. O.D. 12 B.W.G.	22.48	19.50	18.35
3½ in. O.D. 11 B.W.G.	28.37	24.62	23.15
4 in. O.D. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb or ft and over	Base
30,000 lb or ft to 39,999 lb or ft	5 pct
20,000 lb or ft to 29,999 lb or ft	10 pct
10,000 lb or ft to 19,999 lb or ft	20 pct
5,000 lb or ft to 9,999 lb or ft	30 pct
2,000 lb or ft or 4,999 lb or ft	45 pct
Under 2,000 lb or ft	65 pct

PRICES

CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hot strip	17.00c.	17.50c.	24.00c.	35.00c.
Cold strip	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

	Per 1000
Super-duty brick, St. Louis	$68.55
First quality, Pa., Md., Ky., Mo., Ill.	54.45
First quality, New Jersey	59.45
Sec. quality, Pa.; Md. Ky., Mo., Ill.	49.40
Sec. quality, New Jersey	54.15
No. 1 Ohio	45.75
Ground fire clay, net ton	8.05

Silica Brick

Pennsylvania and Birmingham	$54.45
Chicago District	62.45
Silica cement, net ton (Eastern)	9.55

Chrome Brick

	Per Net Ton
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$54.00

Magnesite Brick

Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$43.43
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

EXCEPTIONS TO RPS 6

Ingots, carbon, rerolling—Phoenix Iron Co. may charge $38.75; Kaiser Co., $43.00 f.o.b. Pacific Coast ports; Empire Sheet & Tinplate Co., $34.25; Pgh. Steel Co., $33.10. Granite City Steel, $39.45.

Ingots, carbon, forging—Phoenix Iron Co. may charge $43.00; Empire Sheet & Tinplate Co., $39.25, f.o.b. Mansfield, Ohio; West Coast producers, $48.00, f.o.b. Pacific Coast Ports; Pgh. Steel Co., $38.10.

Ingots, alloy—C/1 delivered Detroit add $2.00; delivered East Michigan add $3.00. Connors Steel Co. may charge $45.00 f.o.b. Birmingham.

Slabs, per gross ton—Andrews Steel Co. $41 basing pts.; Wheeling Steel Corp. (rerolling) 4 in. sq. or larger $37.75 f.o.b. Portsmouth, Ohio; Empire Sheet & Tin Plate Corp. $41; Phoenix Iron Co. (rerolling) $41, (forging) $47; Granite City Steel $47.50; Kaiser Co., (rerolling) $58.64, (forging) $64.64, f.o.b. Los Angeles.

Blooms, per gross ton—Phoenix Iron Co. (rerolling) $41; (forging) $47; Pgh. Steel Co. (rerolling) $38.25, (forging) $44.25; Wheeling Steel Corp. (rerolling) 4 in. sq. or larger $37.75 f.o.b. Portsmouth; Kaiser Co. (rerolling) $58.64, (forging) $64.64 (shell steel) $74.64 f.o.b. Los Angeles.

Sheet Bar, per gross ton—Empire Sheet & Tinplate Co. $39 mill; Wheeling Steel Corp. $38 Portsmouth, Ohio.

Billets, Forging, per gross ton—Andrews Steel Co. $50 basing pts.; Follansbee Steel Corp. $49.50 Toronto, Ohio; Phoenix Iron Co. $47 mill; Geneva Steel Co. $64.64 f.o.b. Pacific Coast; Pittsburgh Steel Co. $49.50; Kaiser Co. $64.64, (shell steel) $74.64, f.o.b. Los Angeles.

PRICES

Billets, Rerolling, per gross ton—Continental Steel Corp. may charge Acme Steel in Chicago switching area $34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) $41 mill; Wheeling Steel Corp. 4 in. sq. or larger $37.75, smaller $39.50 f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at $39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. $41 mill; Continental Steel Corp. (1¾ x 1¾) $39.50, (2 x 2) $40.60 Kokomo, Ind. (these prices include $1 size extra); Keystone Steel & Wire Co. $36.40 Peoria; Connors Steel Co. $50.60 Birmingham; Ford Motor Co. $34 Dearborn, Mich.; Geneva Steel Co. $58.64 f.o.b. Pacific Coast; Pgh. Steel Co. $43.50; Kaiser Co. $58.64 f.o.b. Los Angeles.

Structural Shapes—Phoenix Iron Co. 2.35c. basing pts. (export) 2.50c. Phoenixville; Knoxville Iron Co. 2.30c. basing points; Kaiser Co. 3.20c. f.o.b. Los Angeles.

Rails, per gross ton—Sweet Steel Co. (rail steel) $50 mill; West Virginia Rail Co. (lightweight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron, $45 Pueblo.

Hot Rolled Plate—Granite City Steel Co. 2.85c. produced on DPC eqpt., 2.35c. otherwise; Knoxville Iron Co. 2.25c. basing pts.; Kaiser Co. and Geneva Steel Co. 3.20c. Pacific Ports; Central Iron and Steel Co. 2.50c. basing points; Granite City Steel Co. 2.35c. Granite City.

Merchant Bars—W. Ames Co., 10 tons and over, 2.85c. mill; Eckels-Nye Steel Corp. 2.50c. basing pts. (rail steel) 2.40c.; Phoenix Iron Co. 2.40c. basing pts.; Sweet Steel Co. (rail steel) 2.33c. mill; Joslyn Mfg. & Supply Co., 2.35c. Chicago; Calumet Steel Div., Borg Warner Corp. (8 in. mill bar), 2.35c. Chicago; Knoxville Iron Co., 2.30c. basing pts.; Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.ob Madison, Ill.; Milton Mfg. Co., 2.75c. f.o.b. Milton, Pa.

Pipe Skelp—Wheeling Steel, Benwood, 2.05c.

Reinforcing Bars—W. Ames & Co., 10 tons and over, 2.85c. mill; Sweet Steel Co. (rail steel), 2.33c. mill; Columbia Steel Co., 2.50c. Pacific Ports.

Cold Finished Bars—Keystone Drawn Steel Co. on allocation, Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New England Drawn Steel Co. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to Mansfield, Mass., f.o.b. Mansfield; Empire Finished Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants, f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight Buffalo to Readville, Mass., f.o.b. Readville; Medart Co. in certain areas, Chicago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.

Alloy Bars—Texas Steel Co., for delivery except Texas and Okla., Chicago base, f.o.b. Fort Worth, Tex.; Connors Steel Co., shipped outside Ala., Mississippi, Louisiana, Georgia, Florida, Tenn., Pittsburgh base, f.o.b. Birmingham.

Hot Rolled Strip—Joslyn Mfg. & Supply Co., 2.30c. Chicago; Knoxville Iron Co., 2.25c. basing pts.

Hot Rolled Sheets—Andrews Steel Co., Middletown base on shipments to Detroit or area; Parkersburg Iron & Steel, 2.25c. Parkersburg. Granite City Steel 2.45c.

Galvanized Sheets—Andrews Steel Co. 3.75c. basing pts.; Parkersburg Iron & Steel Co., 3.85c. Parkersburg; Continental Steel Co., Middletown base on Kokomo, Ind., product; Superior Sheet Steel Co., Pittsburgh base except for Lend-Lease.

Pipe and Tubing—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.

Black Sheets—Empire Sheet and Tinplate Co., maximum base price mill is 2.45c. per 100 lb., with differentials, transportation charges, etc., provided in RPS. No. 6.

Wire Products—Pittsburgh Steel Co., f.o.b. Pittsburgh, per 100 lb., rods, No. 5 to 9/32 in., 2.20c.; rods, heavier than 9/32, 2.35c.; bright wire, 2.725c.; bright nails, 2.90c.; lead and furnace annealed wire, 2.85c.; pot annealed wire, 2.85c.; galvanized barbed wire, 3.90c.; plain staples, 2.55c.; galvanized staples, 2.65c.; bright spring wire, 3.30c.; galvanized spring wire, 3.45c.

BASING POINT* BASE PRICES						DELIVERED PRICES† (BASE GRADES)							
Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.	Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	$25.50	$26.00	$26.50	$27.00	....	Boston	Everett	$ .50	$28.00	$28.50	$27.00	$27.50	....
Birdsboro	25.50	26.00	26.50	27.00	$30.50	Boston	Birdsboro-Steelton	4.02	....	....	....	....	$34.52
Birmingham	20.00	21.38	....	26.00	....	Brooklyn	Bethlehem	2.50	28.00	28.50	29.00	29.50	....
Buffalo	24.00	25.00	25.50	26.00	30.50	Brooklyn	Birdsboro	2.92	....	....	....	....	33.42
Chicago	24.50	25.00	25.00	25.50	....	Canton	Cleveland	1.39	25.89	26.39	26.39	26.89	....
Cleveland	24.50	25.00	25.00	25.50	....	Canton	Buffalo	3.19	....	....	....	....	33.69
Detroit	24.50	25.00	25.00	25.50	....	Cincinnati	Birmingham	4.06	24.06	25.44	....	....	....
Duluth	25.00	25.50	25.50	26.00	....	Cincinnati	Hamilton	1.11	....	....	26.11	....	....
Erie	24.50	25.00	25.50	26.00	....	Cincinnati	Buffalo	4.40	....	....	....	....	34.90
Everett	25.50	26.00	26.50	27.00	....	Jersey City	Bethlehem	1.53	27.03	27.53	28.03	28.53	....
Granite City	24.50	25.00	25.00	25.50	....	Jersey City	Birdsboro	1.94	....	....	....	....	32.44
Hamilton	24.50	25.00	25.00	....	....	Los Angeles	Provo	4.95	27.45	27.95	....	....	....
Neville Island	24.50	25.00	25.00	25.50	....	Los Angeles	Buffalo	15.41	....	....	....	....	46.91
Provo	22.50	23.00	....	....	....	Mansfield	Cleveland & Toledo	1.94	26.44	26.94	26.94	27.44	....
Sharpsville[1]	24.50	25.00	25.00	25.50	....	Mansfield	Buffalo	3.36	....	....	....	....	33.86
Sparrows Point	25.50	26.00	....	....	....	Philadelphia	Swedeland	.84	26.34	26.84	27.34	27.84	....
Steelton	25.50	....	....	....	30.50	Philadelphia	Birdsboro	1.24	....	....	....	....	31.74
Swedeland	25.50	26.00	26.50	27.00	....	San Francisco	Provo	4.95	27.45	27.95	....	....	....
Toledo	24.50	25.00	25.00	25.50	....	San Francisco	Buffalo	15.41	....	....	....	....	45.91
Youngstown	24.50	25.00	25.00	25.50	....	Seattle	Provo	4.95	27.45	27.95	....	....	....
						Seattle	Buffalo	15.41	....	....	....	....	45.91
						St. Louis	Granite City	.50	25.00	25.50	25.50	26.00	....
						St. Louis	Buffalo	7.07	....	....	....	....	37.57

* Maximum per gross ton, established by OPA February 14, 1945. † Prices do not reflect 3 per cent tax on freight.

(1) Struthers Iron & Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

Charcoal pig iron base prices for Lyles, Tenn., and Lake Superior furnaces, $33.00 and $34.00, respectively. Newberry Brand of Lake Superior charcoal iron $39.00 per g.t., f.o.b. furnace, by order L 39 to RPS 10, April 11, 1945, retroactive to March 7, 1945. Delivered to Chicago, $42.34. High phosphorus iron sells at Lyles, Tenn., at $28.50.

Basing point prices are subject to switching charges; Silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 to 2.25 per cent); Phosphorus differentials, a reduction of 38c. per ton for phosphorus content of 0.70 per cent and over; Manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

Silvery iron and bessemer ferrosilicon up to and including 14.00 per cent silicon covered by RPS 10 as amended Feb. 14, 1945. Silvery iron, silicon 6.00 to 6.50 per cent, C/L per G.T., f.o.b. Jackon, Ohio—$30.50; f.o.b. Buffalo—$31.75. Add $1.00 per ton for each additional 0.50% Si. Add 50c. per ton for each 0.50% Mn over 1.00%. Add $1.00 per ton for 0.75% or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.o.b. shipping point, ¢ per lb, ton lots.

Copper, electrolytic, 150 and 200 mesh	21½¢ to 23½¢
Copper, reduced, 150 and 200 mesh	20½¢ to 25½¢
Iron, commercial, 100 and 200 mesh 96 + % Fe	12½¢ to 15¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots	4¢
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe, drum lots	63¢
Iron, electrolytic, unannealed, 300 mesh and coarser, 99 + % Fe	30 to 33¢
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	42¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90¢
Aluminum, 100 and 200 mesh	*25¢
Antimony, 100 mesh	30¢
Cadmium, 100 mesh	$1.40
Chromium, 100 mesh and finer	$1.25
Lead, 100, 200 & 300 mesh	11½ to 15¢
Manganese	65¢
Nickel, 150 mesh	51½¢
Solder powder, 100 mesh	8½¢ plus metal
Tin, 100 mesh	58¾¢
Tungsten metal powder, 98%-99%, any quantity, per lb	$2.60
Molybdenum powder, 99%, in 200-lb kegs, f.o.b. York, Pa., per lb	$2.60
Under 100 lb	$3.00

*Freight allowed east of Mississippi.

COKE

	Net Ton
Furnace, beehive (f.o.b. oven)	
Connellsville, Pa.	$7.50*
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.10
Connellsville, Pa.	9.00
Foundry, By-Product	
Chicago, del'd	13.35
Chicago, f.o.b.	13.60
New England, del'd	14.25
Kearny, N. J., f.o.b.	13.65
Philadelphia, del'd	13.85
Buffalo, del'd	13.00
Portsmouth, Ohio, f.o.b.	11.10
Painesville, Ohio, f.o.b.	11.75
Erie, del'd	13.75
Cleveland, del'd	13.80
Cincinnati, del'd	13.85
St. Louis, del'd	13.85
Birmingham, del'd	10.50

*Hand drawn ovens using trucked coal permitted to charge $3.00 per ton plus transportation charges.

PRICES

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:

Base discount less case lots

	Per Cent Off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all lengths	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.
Base discount less keg lots		
7/16 in. and smaller	..	64
½ in. and smaller	62	..
⅝ in. through 1 in.	..	60
9/16 in. through 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full keg lots, 10 per cent additional discount.

Stove Bolts	*Consumer*
Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

Large Rivets

(½ in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets

(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws	*Consumer Per Cent Off List*
Upset full fin, hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.30c.
Armature	3.65c.
Electrical	4.15c.
Motor	5.05c.
Dynamo	5.75c.
Transformer 72	6.25c.
Transformer 65	7.25c.
Transformer 58	7.75c.
Transformer 52	8.55c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

Ferromanganese

78-82% Mn, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk) $150.00
Carload lots (packed) 141.00
Less ton lots (packed) 148.50

$1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Manganese Metal

Contract basis, lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Spot sales add 2c. per lb.

96-98% Mn, .2% max. C, 1% max. Si, 2% max. Fe.
Carload, bulk ..... 36c.
L.c.l. lots ..... 38c.

95-97% Mn, .2% max. C, 1.5% max. Si, 2.5% max. Fe.
Carload, bulk ..... 34c.
L.c.l. lots ..... 35c.

Spiegeleisen

Maximum base, contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$35.00	$36.00
Less ton	47.50	48.50

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carloads, f.o.b. shipping point with freight allowed.

	Eastern Zone	Central Zone	Western Zone
50% Si ...	6.65c.	7.10c.	7.25c.
75% Si ...	8.05c.	8.20c.	8.75c.
80-90% Si.	8.90c.	9.05c.	9.55c.
90-95% Si.	11.05c.	11.20c.	11.65c.

Spot sales add: 45c. per lb. for 50% Si, .3c. per lb. for 75% Si, .25c. per lb. for 80-90% and 90-95% Si.

Silvery Iron

Silvery Iron, Silicon 14.01 to 14.50 per cent, $45.50 per G. T. f.o.b. Jackson, Ohio. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 per ton for low impurities, not to exceed: P—0.05%, S—0.04%, C—1.00%. Covered by MPR 405.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe..	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe..	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	3.35c.	3.50c.	3.65c.
2000 lb-carload	3.3c.	4.2c.	4.25c.

Silicomanganese

Contract basis lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Add .25c. for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk ..... 6.05c.
2000 lb. to carload ..... 6.70c.
Under 2000 lb. ..... 6.90c.
Briquets, contract, basis carlots, bulk freight allowed, per lb. ... 5.80c.
2000 lb. to carload ..... 6.30c.
Less ton lots ..... 6.55c.

Ferrochrome

(65-72% Cr. 2% max. Si)

OPA maximum base contract prices per lb. of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add .25c. per lb. contained Cr for spot sales.

	Eastern Zone	Central Zone	Western Zone
0.06% C	3.00c.	23.40c.	24.00c.
0.10% C	2.50c.	22.90c.	23.50c.
0.15% C	2.00c.	22.40c.	23.00c.
0.20% C	21.50c.	21.90c.	22.50c.
0.50% C	21.00c.	21.40c.	22.00c.
1.00% C	20.50c.	20.90c.	21.50c.
2.00% C	19.50c.	19.90c.	21.00c.
66-71% Cr, 4-10%	13.00c.	13.40c.	14.00c.
62-66% Cr, 5-7% C	13.50c.	13.90c.	14.50c.

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2c. per lb. to regular low-carbon ferrochrome price schedule. Add 2c. for each additional 0.25% N. High-carbon type: 66-71% Cr, 4-5% C, 0.75% N. Add 5c. per lb. to regular high-carbon ferrochrome price schedule.

Low-Carbon Ferromanganese

Contract prices per lb. of manganese contained, lump size, f.o.b. shipping point, freight allowed to destination, Eastern Zone. Add 0.25c. for spot sales.

	Carloads, Bulk	Ton Lots	Less Ton
0.10% max. C, 1 or 2% max. Si..	23.00c.	23.40c.	23.65c.
0.15% max. C, 1 or 2% max. Si..	22.00c.	22.40c.	22.65c.
0.30% max. C, 1 or 2% max. Si..	21.00c.	21.40c.	21.65c.
0.50% max. C, 1 or 2% max. Si..	20.00c.	20.40c.	20.65c.
0.75% max. C, 7.00% max. Si..	16.00c.	16.40c.	16.65c.

Ferrochrome Briquets

Contract prices per lb. of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 60 per cent contained chromium. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk..	8.25c.	8.55c.	8.95c.
Ton lots	8.75c.	9.25c.	10.75c.
Less ton lots..	9.00c.	9.50c.	11.00c.

Ferromanganese Briquets

Contract prices per lb. of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 66 per cent contained manganese. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk..	6.05c.	6.30c.	6.60c.
Ton lots	6.65c.	7.55c.	8.55c.
Less ton lots..	6.80c.	7.80c.	8.80c.

Calcium—Manganese—Silicon

Contract prices per lb. of alloy, lump size, f.o.b. shipping point, freight allowed to destination.

16-20% Ca, 14-18% Mn, 53-59% Si. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carloads	15.50c.	16.00c.	18.05c.
Ton lots	16.50c.	17.35c.	19.10c.
Less ton lots.	17.00c.	17.35c.	19.60c.

Calcium Metal

Eastern zone contract prices per lb. of metal, f.o.b. shipping point, freight allowed to destination. Add 5c. for spot sales. Add 0.9c. for Central Zone; 0.49c. for Western Zone.

	Cast Turnings	Distilled
Ton lots	$1.80	$2.30	$5.00
Less ton lots..	2.30	2.80	5.75

Chromium—Copper

Contract price per lb. of alloy, f.o.b. Niagara Falls, freight allowed east of the Mississippi River. 8-11% Cr, 88-90% Cu, 1.00% max. Fe, 0.50% max. Si. Add 2c. for spot sales.

Shot or ingot ..... 45c.

Ferroboron

Contract prices per lb. of alloy, f.o.b. shipping point, freight allowed to destination. Add 5c. for spot sales. 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern Zone	Central Zone	Western Zone
Ton lots	$1.20	$1.2075	$1.229
Less ton lots..	1.30	1.3075	1.329

Manganese—Boron

Contract prices per lb. of alloy, f.o.b. shipping point, freight charges allowed. Add 5c. for spot sales.

75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

	Eastern Zone	Central Zone	Western Zone
Ton lots	$1.89	$1.903	$1.935
Less ton lots..	2.01	2.023	2.055

Nickel—Boron

Spot and contract prices per lb. of alloy, f.o.b. shipping point, freight allowed to destination.

15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

	Eastern Zone	Central Zone	Western Zone
11,200 lb. or more	$1.90	$1.9125	$1.9445
Ton lots	2.00	2.09125	2.0445
Less ton lots .	2.10	2.1125	2.1445

Other Ferroalloys

Ferrotungsten, Standard grade lump or ¼X down, packed, f.o.b. plant at Niagara Falls, New York, Washington, Pa. York, Pa., per lb. contained tungsten, 10,000 lb. or more.... $1.90

Ferrovanadium, 35-55%, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. contained Va.
Open hearth $2.70
Crucible $2.80
Primos $2.90

Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal..... $1.50

Vanadium pentoxide, 88-92% V_2O_5 technical grade, contract basis, any quantity, per lb. contained V_2O_5. Spot sales add 5c. per lb. contained V_2O_5..... $1.10

Silcaz No. 3, contract basis, f.o.b. producer's plant with usual freight allowances, per lb. of alloy. (Pending OPA approval)
Carload lots ..... 25c.
2000 lb. to carload..... 26c.

Silvaz No. 3, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy (Pending OPA approval)
Carload lots ..... 58c.
2000 lb. to carload..... 59c.

Grainal, f.o.b. Bridgeville, Pa., freight allowed 50 lb. and over, max. based on rate to St. Louis
No. 1 ..... 87.5c.
No. 6 ..... 60c.
No. 79 ..... 45c.

Bortram, f.o.b. Niagara Falls
Ton lots, per lb..... 45c.
Less ton lots, per lb..... 50c.

Ferrocolumbium, 50-60%, contract basis, f.o.b. plant with freight allowances, per lb. contained Cb.
2000 lb. lots $2.25
Under 2000 lb. lots..... $2.30

Ferrotitanium, 40-45%, 0.10%C. max. f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained Ti.. $1.23
Less ton lots..... $1.25

Ferrotitanium, 20-25%, 0.10%C. max., ton lots, per lb. contained titanium $1.35
Less ton lots..... $1.40

High-carbon ferrotitanium, 15%-20%, 6-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y. freight allowed East of Mississippi River, north of Baltimore and St. Louis, per carload.....$142.50

Ferrophosphorus, 18% electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equalled with Rockdale, Tenn., per gross ton..... 58.50

Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Sigio), Tenn., $3 unitage freight equalized with Nashville, per gross ton $75.00

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., any quantity, per lb. contained Mo. 95c.

Calcium molybdate, 40-45%, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained Mo. ..... 80c.

Molybdenum oxide briquets, 48-52% Mo. f.ob. Langeloth, Pa. per lb. contained Mo..... 80c.

Molybdenum oxide, in cans, f.o.b Langeloth and Washington, Pa. per lb. contained Mo..... 80c.

Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy. Add ¼c. for spot sales
Carload lots ..... 14c.

Zirconium, 12-15%, contract basis, lump f.o.b. plant usual freight allowances, per lb. of alloy
Carload, bulk ..... 4.6c.

Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk ..... 5.75c.
Ton lots ..... 7.25c.

Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.
Car lots ..... 8.00c.
Ton lots ..... 8.75c.
Less ton lots ..... 9.25c.

Revision of Priority Regulation to Help Small Manufacturers

Washington

• • • Provisions of the priorities regulation that permits small manufacturers to obtain production materials, including controlled materials, have been clarified by WPB. Interpretation 1 to PR-27 explains that the regulation permits a manufacturer to use its procedures to obtain controlled materials or other production materials up to Dec. 31, "if total production is not expected to be more than $50,000 worth of all products manufactured in any calendar quarter in which materials purchased under this regulation will be used." The $50,000 limit refers to all products manufactured and not just to products manufactured with materials obtained under PR-27, the interpretation says.

The clause "in which you use materials purchased under this regulation" obviously refers to the words "in any calendar quarter" and not to the words "products manufactured by you," the interpretation continues. This is made clear by the subsequent provision of paragraph (b), which explains the method of determining whether a person comes within the $50,000 limit, it says.

The interpretation adds that the provision quoted above means exactly the same as if it read: "Your total production is not expected to be any more than $50,000 worth of all products manufactured by you in any calendar quarter during which you use materials purchased under this direction."

Canada Dropping Most Steel Orders

Toronto

• • • The majority of government controls that were put in effect to assist Canada's war effort, with regard to the supply of raw materials, as well as a number of finished products, are now being abandoned. Insofar as iron and steel are concerned, civilian consumers now are permitted to place orders direct with producing companies without the necessity of having them approved by the Steel Controller. However, the Steel Controller continues to allocate war business.

Despite this change in civilian status the supply of steel, especially bars and sheets, is not available in large quantities and mills are almost solidly booked on bars to the end of this year and sheet backlogs extend through first quarter of 1946. Thus while manufacturers of consumer goods are permitted to order steel supplies direct, they are unable to obtain early delivery, with the result that there is little chance of civilian production schedules getting underway on a broad scale until early next year. The automotive industry in Canada is expected to go into production of civilian motor cars in October.

C. D. Howe, Minister of Munitions and Supply announced the lifting of steel control restriction on the distribution of steel from warehouses in Canada, following similar action by the War Production Board in the United States. The rescinded order limited the amount of steel which any consumer could purchase from warehouse stock for purposes other than war and highly essential civilian production, to 10 tons of carbon steel and 2 tons of alloy steel during each calendar quarter.

The Minister also announced removal of restrictions on deliveries of new machinery and equipment to gold mines and disclosed that priority assistance will be given to aid in procuring United States supplies for maintaining and repairing existing equipment. He cautioned, however, that because manufacturers still will be required to give first priority to war, and highly essential civilian requirements, shortages still exist with respect to many types of equipment.

Buzz Bombs Ordered

Toledo

• • • A $26,000,000 order for buzz bombs, requiring 600 workers for a period estimated at one year, has been awarded Willys-Overland Motors Inc. by the Army Air Forces, according to an announcement this week. The buzz bomb is jet propelled and 27 feet in length. Workers for the present order, which augments the original production, will be supplied from other departments.

PIG IRON OUTPUT DOWN: *June output of pig iron again showed a decline. More furnaces have been taken off for repairs recently which has caused supplies of iron to be tighter than for some time. In June blast furnaces in the country operated at* 83.1 *pct of capacity compared with* 87.7 *pct in May.*

Blast Furnace Capacity and Production—Net Tons

Source: American Iron & Steel Institute

	Number of Companies	Annual Blast Furnace Capacity	PRODUCTION							
			PIG IRON		FERRO-MANGANESE AND SPIEGEL		TOTAL		Per Cent of Capacity	
			June	Year to Date	June	Year to Date	June	Year to Date	June	Year to Date
DISTRIBUTION BY DISTRICTS:										
Eastern	12	12,988,970	797,059	5,043,229	33,225	184,860	830,284	5,228,089	77.7	81.1
Pittsburgh-Youngstown	15	25,904,240	1,899,765	11,672,774	17,098	120,457	1,916,863	11,793,231	89.9	91.6
Cleveland-Detroit	7	6,589,500	463,997	2,973,562			463,997	2,973,562	85.6	90.9
Chicago	7	14,070,510	1,000,894	6,271,463	2,222	15,136	1,003,116	6,286,599	86.6	90.0
Southern	8	4,924,670	241,341	1,838,358	8,077	76,405	249,418	1,912,763	61.6	78.3
Western	4	2,836,000	141,334	948,039			141,334	948,039	60.6	67.4
TOTAL	37	67,313,890	4,544,390	28,745,425	60,622	396,858	4,605,012	29,142,283	83.1	87.3

Rockrite rolled tubing

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PRODUCT DESIGNERS

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THE ROCKRITE PROCESS of sizing seamless tubing differs radically from the customary cold-draw method. This new process is a combination of compression, cold forging and extrusion that sizes tubing more accurately—with greater concentricity and less ovality, and to tolerances that are half or less than half those of ordinary cold-sized tubing. Rockrite Tubing is supplied in straight and tapered styles in ferrous, nonferrous and telescoped bi-metal combinations.